CANADIAN GEOGRAPHICAL JOURNAL

SEPTEMBER
1944

VOL. XXIX
No. 3

PEDOLOGY, 'THE DIRT SCIENCE', AND AGRICULTURAL SETTLEMENT IN ONTARIO

ESKIMO POPULATION IN THE CANADIAN EASTERN ARCTIC
Distribution, Numbers and Trends

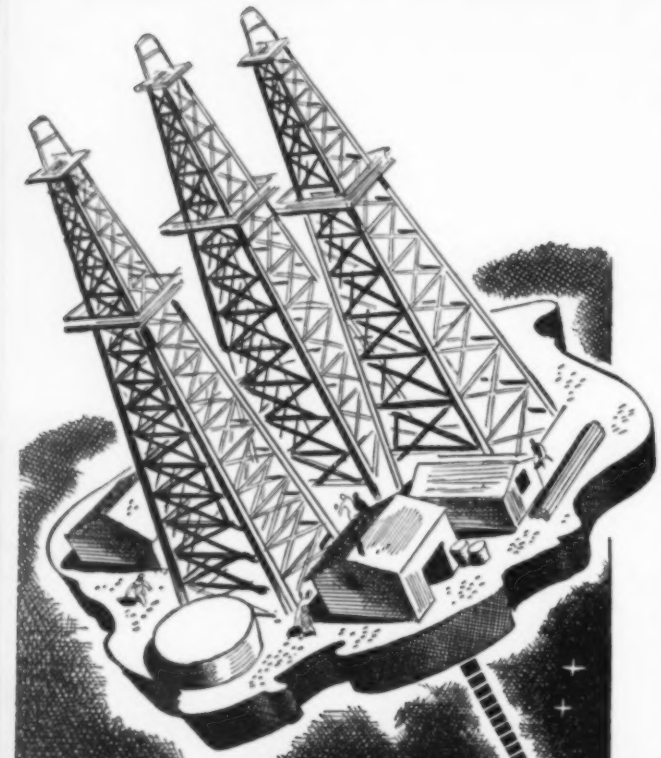
POLAND IN THE EUROPEAN BALANCE

GOOD WIND PUSHING - Jottings of a Cycle Trip in Brittany, 1938

$3.00 A YEAR

35c A COPY

CANOL was born in 1920



SINCE THE ICE AGE Canada's vast Northland lay wrapped in timeless slumber . . . Then, in 1914, a little group of prospectors approached the Arctic frontiers in search of petroleum.

By 1919 Imperial Oil geologists had narrowed down this Northern quest to an area along the Mackenzie River near the tip-top of Canada's map. In 1920, near Fort Norman, the drill struck oil!

As the North opened up, a small refinery was built to serve the pioneer airplanes, mines and river craft.

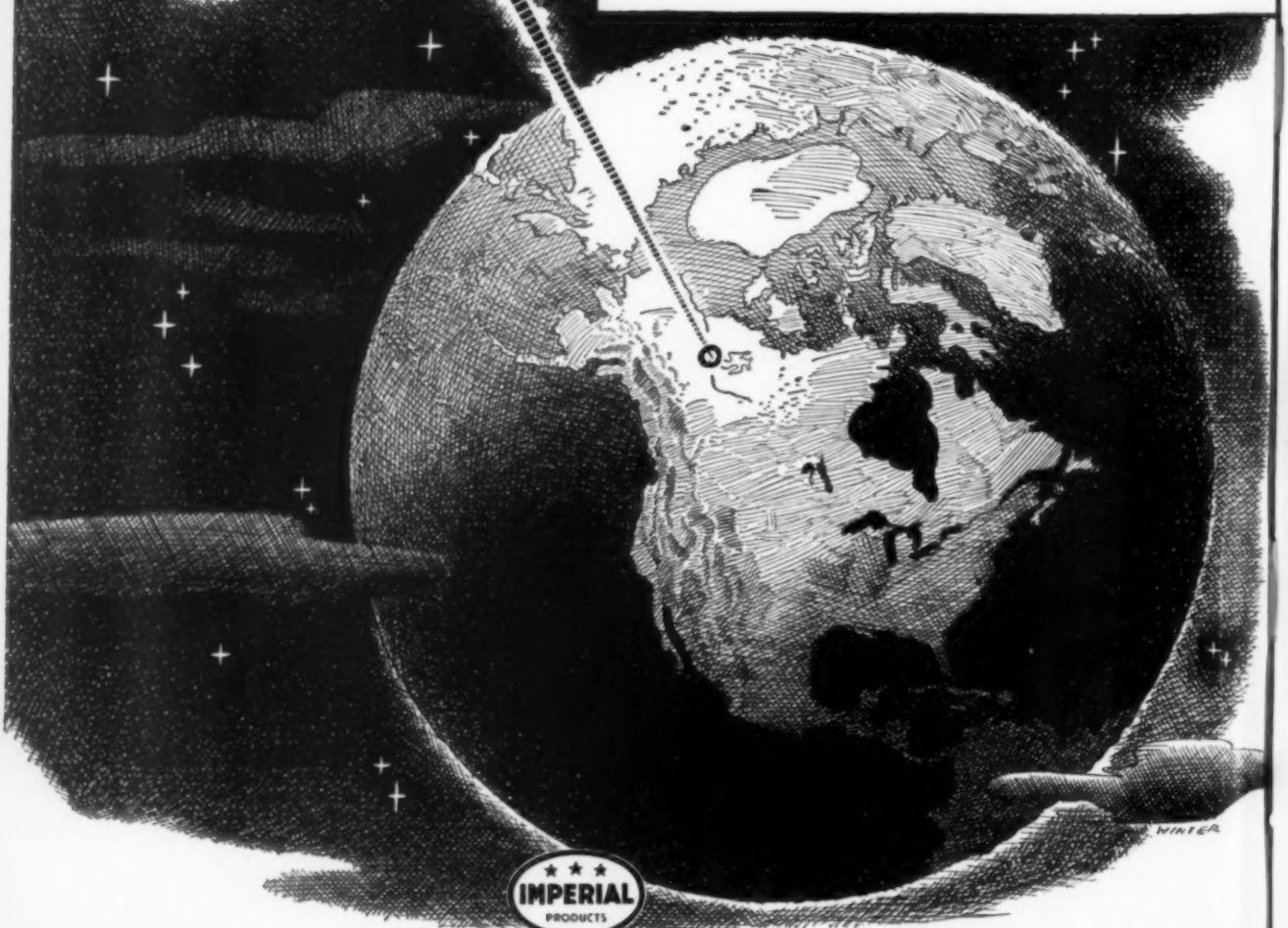
Then came Pearl Harbor! Shipping on the Pacific seaboard was menaced. Could another supply of oil for coastal defence, for the protection of Alaska and for attack through the Aleutians be developed? Imperial Oil was asked by the U.S. army to get the answer to that vital question.

Thus Canol developed; and while Imperial geologists and drillers sought and found more oil, the enormous program of waterway, road and air transport, of pipe line and refinery construction, went on apace.

Today the Canol project is completed. A supply of oil for military needs has been secured; there is hope for further discovery, and the territory is open to all oil seekers who care to stake their knowledge and capital.

Imperial Oil has undertaken to risk large amounts of capital in an effort to "prove up" enough oil to warrant the enormous expenditure needed for a pipe line before the oil can be brought to commercial markets.

It is a job that calls for time, patience and perseverance, but it is no more fantastic than the Canol of today would have seemed to the men driving the first drilling bit down to Norman's oil sands twenty-four years ago.



IMPERIAL OIL LIMITED

CANADIAN GEOGRAPHICAL JOURNAL

Published monthly by
The Canadian Geographical Society
49 Metcalfe Street, Ottawa

Editor – *Gordon M. Dallyn*

This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustrations, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth and other parts of the world in which Canada has special interest.

Contents

SEPTEMBER 1944 VOLUME XXIX No. 3

COVER SUBJECT:—Up the road toward Lézardrieux, Paimpol shoppers cycle home. You are never too old to ride a bicycle in Brittany, and, in spite of their full baskets, it takes a steep hill to make these women get off and walk. The useful umbrella finds a place in the shopping basket too, for September weather is unpredictable. The telephone pole on the left side of this road is of concrete, as are most poles in this part of France.

PAGE

PEDOLOGY, 'THE DIRT SCIENCE', AND AGRICULTURAL SETTLEMENT IN ONTARIO by G. A. HILL 106

ESKIMO POPULATION IN THE CANADIAN EASTERN ARCTIC Distribution, Numbers and Trends by J. LEWIS ROBINSON 128

POLAND IN THE EUROPEAN BALANCE by BERNARD TROTTER and J. W. WATSON 143

GOOD WIND PUSHING—Jottings of a Cycle Trip in Brittany, 1938 by BETTY BRIDGMAN 150

EDITOR'S NOTE-BOOK IX

AMONGST THE NEW BOOKS X

• • • •

The articles in this Journal are indexed in the *Reader's Guide to Periodical Literature* and the *Canadian Periodical Index* which may be found in any public library.

The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1936.

Contents of this Journal are copyright.

Address all communications regarding change of address, non-delivery of Journal, etc., to the publication office, 2151 Ontario Street, East, Montreal, Canada, giving old and new address. On all new memberships, the expiry date will be printed on wrapper containing starting number. This will constitute a receipt for subscription

Membership in The Canadian Geographical Society is $3.00 per year in Canada and other parts of the British Empire, which includes delivery of the Journal, postpaid; in United States, Mexico, France, Spain, Central and South America, $3.50; in other countries, $4.00. Make membership fee payable at par in Ottawa.

Member Audit Bureau of Circulations.

Special Representatives:

Ontario: F. A. Dallyn, 21 King Street, E., Toronto, (Tel. EL. 2863)
Quebec: F. A. Dallyn, 2151 Ontario Street, E., Montreal, (Tel. FR. 1722)
Europe: Norah C. Perry, 5 Upper Dagnall Street, St. Albans, Herts., England

Entered as second-class matter at the Post Office, Montreal, Canada.

PRINTED IN CANADA

Above:—Wet intrazonal soils of the Cochrane Clay Belt. These half-bog soils of the podsol zone are generally covered with black spruce.

Left: — "Muskeg". These wet azonal soils in the podsol zone support a cover of sphagnum moss and heath plants, but few trees of merchantable size.

Right:—A very shallow soil over bedrock on Mount McKay near Fort William. This dry azonal soil is too dry or barren for forestry. Note the dwarfed and gnarled form of the trembling aspen. There is probably less than ten per cent of Ontario which can be truly classed as a lithosol or rock-soil.

Left:—Zonal podsol soils near Pagwa. These are developed on areas which are well drained. The characteristic vegetation is white spruce and balsam fir with a fair sprinkling of poplar.

*Photographs accompanying this article, with the few exceptions noted, were taken by the author while he was associated with the Ontario Soil Survey; special acknowledgement is extended to Mr. W. Tolton, Director of Extension, Ontario Agricultural College, for technical direction.

PEDOLOGY, 'THE DIRT SCIENCE', AND AGRICULTURAL SETTLEMENT IN ONTARIO

by G. A. HILLS*

THERE are those, and their numbers are legion, who look upon dirt as soil and upon soil as dirt. To some of these, soil is the dirt beneath their feet—a contemptible thing, fit only to be trodden upon. To others, soil is the giver of life—and blessed is the 'dirt farmer'. When the soil scientist or pedologist examines 'the dirt' in the field, he sees, not filth, not something supernatural, but natural bodies which to him are as distinctive as plants or animals. These natural bodies, the pedologist believes, provide not only 'the stuff empires are made of' but, through the pattern of their distribution, furnish a plan for national development. This scientific concept of soils will prove most helpful to those who wish to analyse the progress of agricultural settlement in Ontario in an attempt to meet the popular demand for efficient post-war settlement.

Early explorers noted many changes in the landscape as they traversed that vast country which is now Ontario. In the south, forests of elm and ash covered extensive flats of dark coloured clays, whereas maple, beech and other hardwoods crowned the morainic uplands. Proceeding to Muskoka and northward, these explorers encountered the rocky Precambrian uplands of the Canadian Shield, with their shallow pine-covered sands, and here and there a 'clay pocket'. Once across this great rocky divide, they found a great clay belt which stretched northward to meet the bogs which encircle James Bay. Surely here was the northern counterpart of the rich lands of Southern Ontario! Though black spruce and balsam fir covered most of this great northern plain, the dark-coloured clay soil appeared as productive as that of the flats along the lower Great Lakes. "How could the fertility of two virgin clays be different?" some may ask. Others may wish to know if such conjectures are the only means which have been employed to determine the suitability of lands for agricultural settlement.

During the early development of agriculture in America the possibilities or potentialities of land have been determined largely by trial and error. Land was plentiful, and, if one location did not permit of exploitation after the timber was gone, it could be readily abandoned in favour of another. In this way, the pioneer fringe was pushed ever westward and northward, leaving in its train many abandoned and partially developed farmlands.

In Ontario, the earliest agricultural settlement was established by the French near Windsor. It was not until the coming of the United Empire Loyalists in the 1780's that the farm settlements were extended very far beyond the Essex and Niagara Peninsulas. In a hundred years the frontier had crossed the deeper lands of Southern Ontario and had reached the threshold of the rocky lands to the north. It was soon to penetrate to many of the northern clay pockets, finally reaching the great clay belt of the Cochrane district about 1910.

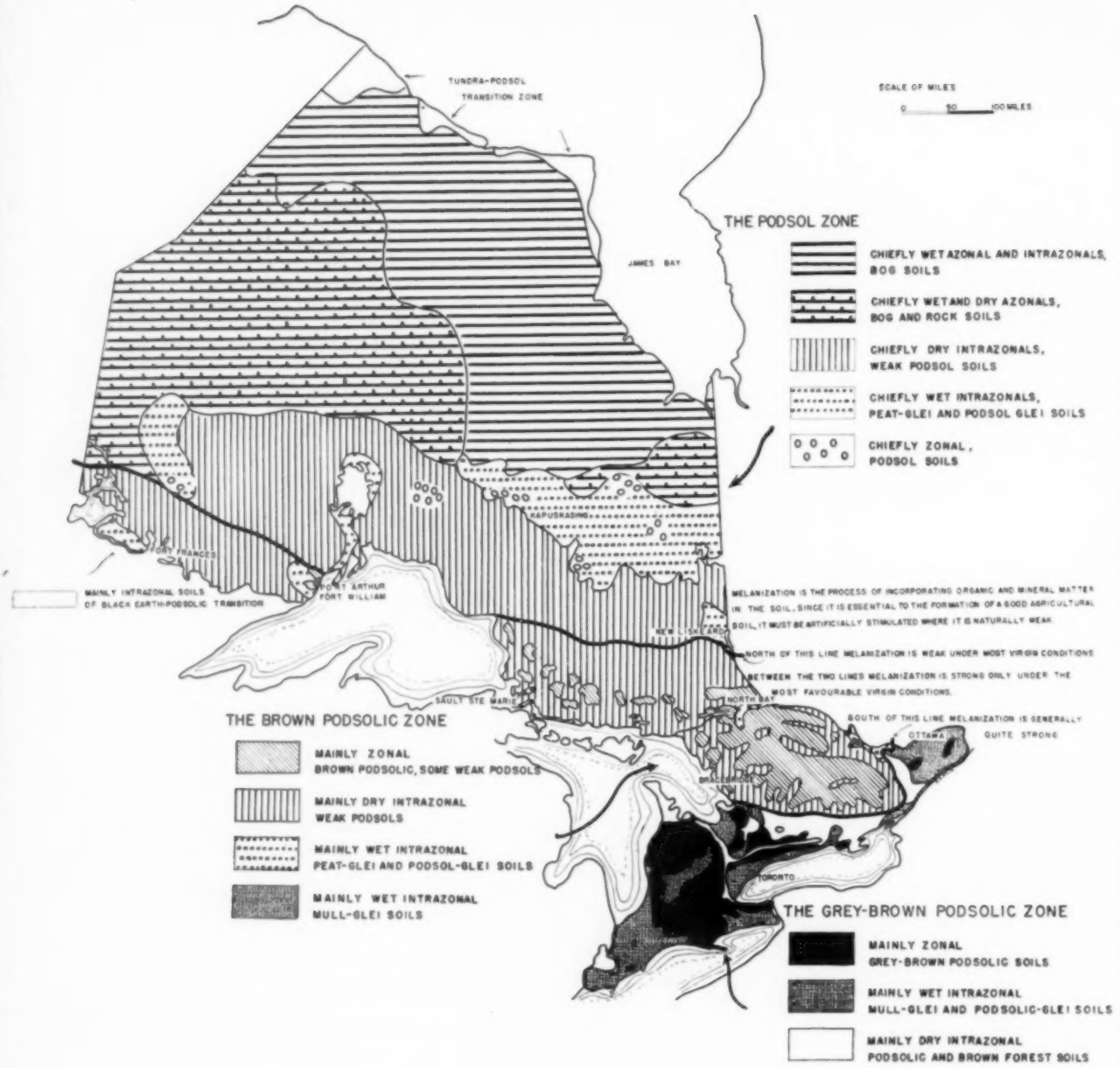
The policy of agricultural development in Ontario has tended to establish a full-time, commercial type of agriculture on all lands opened for settlement, irrespective of their natural qualities. This has proven successful, for the most part, on the deep soils of Southern Ontario. Even there we see areas which wind and water have laid waste, and many other indications of the misuse of land. On the shallow and sandy soils of the Canadian Shield, the experiment has definitely failed; neither has a purely agricultural economy been established on the northern clay belts except on a few locations. This failure is more significant

---

EDITOR'S NOTE: To those responsible for or interested in the vital question of putting Ontario's land to the best use, this article is recommended for intensive study. Supplementary articles, dealing with other phases of this question, which will repay further review are as follows:—

The Climate of Southern Ontario—September, 1938
The Geographic Setting of Northern Ontario—March, 1939
Forest Regions of Canada—October, 1939
Northern Ontario—October, 1941
Adaptation of Crops in Ontario—May, 1942
The History and Status of Forestry in Ontario—September, 1942

SOIL ZONE MAP OF ONTARIO


TUNDRA-PODSOL TRANSITION ZONE
SCALE OF MILES
0 50 100 MILES
THE PODSOL ZONE
CHIEFLY WET AZONAL AND INTRAZONALS, BOG SOILS
CHIEFLY WET AND DRY AZONALS, BOG AND ROCK SOILS
CHIEFLY DRY INTRAZONALS, WEAK PODSOL SOILS
CHIEFLY WET INTRAZONALS, PEAT-GLEI AND PODSOL GLEI SOILS
CHIEFLY ZONAL, PODSOL SOILS
JAMES BAY
FORT FRANCES
FORT ARTHUR
FORT WILLIAM
KAPUSKASING
NEW LISKEARD
SAULT STE MARIE
NORTH BAY
OTTAWA
BRANTFORD
TORONTO
MAINLY INTRAZONAL SOILS OF BLACK EARTH-PODSOLIC TRANSITION
MELANIZATION IS THE PROCESS OF INCORPORATING ORGANIC AND MINERAL MATTER IN THE SOIL. SINCE IT IS ESSENTIAL TO THE FORMATION OF A GOOD AGRICULTURAL SOIL, IT MUST BE ARTIFICIALLY STIMULATED WHERE IT IS NATURALLY WEAK.
NORTH OF THIS LINE MELANIZATION IS WEAK UNDER MOST VIRGIN CONDITIONS
BETWEEN THE TWO LINES MELANIZATION IS STRONG ONLY UNDER THE MOST FAVOURABLE VIRGIN CONDITIONS.
SOUTH OF THIS LINE MELANIZATION IS GENERALLY QUITE STRONG
THE BROWN PODSOLIC ZONE
MAINLY ZONAL BROWN PODSOLIC, SOME WEAK PODSOLS
MAINLY DRY INTRAZONAL WEAK PODSOLS
MAINLY WET INTRAZONAL PEAT-GLEI AND PODSOL-GLEI SOILS
MAINLY WET INTRAZONAL MULL-GLEI SOILS
THE GREY-BROWN PODSOLIC ZONE
MAINLY ZONAL GREY-BROWN PODSOLIC SOILS
MAINLY WET INTRAZONAL MULL-GLEI AND PODSOLIC-GLEI SOILS
MAINLY DRY INTRAZONAL PODSOLIC AND BROWN FOREST SOILS

when it is recognized that the western prairies have been opened up and settled since the discovery of these clay belts. It is evident that the northern forested soils, though virgin, do not lend themselves to agricultural exploitation except under the most favourable conditions. These comparisons in the rapidity of development indicate a difference between the agricultural potentialities of the northern spruce-fir lands and those of the elm-ash lands of Southern Ontario or those of the grassland soils of the West.

This experience in land settlement has shown that while single features of the landscape, such as natural vegetation or soil materials, are useful indicators of agricultural possibilities, they are not infallible. Elm-ash lands are good, providing they are underlain by clay or loam and can be economically drained. Clay lands are fairly good if they have been covered long enough with an elm-ash forest, but not so good if they occur where the dominant forest is black spruce or some other conifer. It is evident then that

it is a combination of landscape features, and not a single factor, which indicates the agricultural potentialities of land. This matter of combined environmental factors has been given a great deal of consideration in the new soil science, for it has been found that different soils are produced under a different combination of landscape features. Soil Science was thus to furnish not only the fundamental data on soils but also to provide an index for each combination of environmental features.

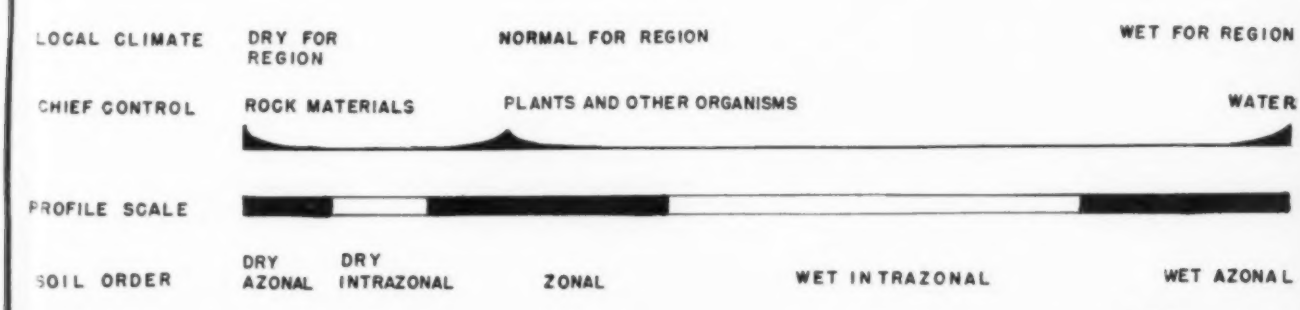
This new science of pedology was evolving in Russia about the time the agricultural frontier was pushing into Northern Ontario. Unfortunately, some time elapsed before this philosophy of soils reached America. Much work has been done along these lines in the United States since 1920. The new study was introduced to Canada a few years later, and a small group of soil surveyors are now at work in each province, largely on projects in which federal and provincial departments of agriculture are joint sponsors.

Soil is the cradle of all life. For simple organisms soil is merely a combination of organic and inorganic substances. Minerals dissolved in the waters of our lakes and seas constitute the 'soil' for many lowly forms of life. Similarly, the films of moisture, which surround the rock particles on a bare land surface, may contain sufficient food in solution to support certain forms of bacteria and other organisms. Such simple types differ greatly from the complex soil bodies studied by scientists. These simple cradles of life, however, under favourable circumstances are gradually transformed into the soils we know. This change is brought about largely through the organisms themselves not only during their growth but by the addition of their decaying remains to the original cradle. Each time the cradle becomes a burial place it is changed so that, in time, it is occupied by higher forms of life. Lichens and mosses are among the first to compete with the bacteria. The former, under favourable conditions, improve the location or site so that herbs, shrubs, and later trees of various types can appear. The lower forms of life are not entirely replaced by the higher forms but frequently continue to assist in the development of the site.

The soil has gradually become a natural body or entity which continues to develop as its environment changes. The 'soil skeleton' consists of particles of broken rock known as clay, silt, or sand according to their size. The individual clay particle is so small that it cannot be seen under the ordinary microscope, and is colloidal in nature. Silt is slightly larger than clay. Upon this mineral skeleton, clay and humus colloids are formed through the action of climate and living organisms. This film of clay-humus may be likened unto a 'living tissue', since in it most of the soil reactions take place.

It is evident that there will be a broad change in the soil with every change in the regional vegetation. Soils formed under grass will be different to soils formed under trees. There will be differences in both soil and vegetation in each of the various climatic zones. It is also easy to see that any local change in the rocky parent material will also result in a different kind of soil. As a result of this contact with the atmosphere and life, soils differ from their parent rocky material in that they are composed of horizontal layers or horizons which contain at least a small percentage of organic matter. These horizons differ from place to place, and from time to time, depending upon the combination of environmental factors under which they are formed.

The soil profile is a cross-section of all the soil horizons occurring along a line drawn vertically from any point on the earth's surface towards its interior. Soil profiles may be observed in exposed banks along highways or railways. It is there that one can see the individuality of soils due to differences in climate, vegetation, rocky materials, drainage, etc.



THE SOIL PROFILE IS A PART OF THE NATURAL ENVIRONMENT

1. CLIMATE

LOCAL VARIATIONS OF THE ORIGINAL CLIMATE HAVE A STRONG INFLUENCE ON THE TYPE OF PLANT AND ANIMAL LIFE AND ON SOIL TYPE

2. ORGANISMS

PLANTS AND ANIMALS LIVE ON OR WITHIN THE SOIL.
THEY TAKE FROM THE SOIL DURING THEIR LIFE-TIME.
THEY ADD TO IT UPON THEIR DEATH.

3 SOIL PROFILE

PLANT, ANIMAL AND MINERAL MATTER COMBINE TO FORM THE LAYERS OR HORIZONS OF THE SOIL PROFILE

A_0 ... THE ORGANIC REMAINS OF PLANTS AND ANIMALS MERGE TO FORM THE A_0 HORIZON.

A_1 ... ORGANIC AND MINERAL MATTER ARE INCORPORATED TO FORM THE A_1 HORIZON(VERY DARK IN THIS PROFILE)

A_2 ... WATER PASSING THROUGH THE ORGANIC MATTER BECOMES ACID AND LEACHES MANY ELEMENTS FROM THE SOIL TO FORM THE ASHY-GREY A_2 HORIZON, RICH IN SILICA.

B ... SOME OF THE LEACHED COLLOIDS ACCUMULATE TO FORM THE BROWN-BROWN B HORIZON.

ALTHOUGH THE A AND B HORIZONS HAVE DEVELOPED WITHIN THE SKELETON OF GEOLOGIC MATERIALS, THEY ARE EASILY DISTINGUISHABLE FROM THEM. UNDERLYING THESE, HOWEVER, ARE GEOLOGIC MATERIALS WHICH ARE ONLY SLIGHTLY CHANGED. SINCE THESE ARE PENETRATED BY PLANT ROOTS ETC. THEY ARE CONSIDERED PART OF THE SOIL PROFILE TOO. IF THEY ARE OF THE SAME ORIGIN AS THE UPPER SOIL SKELETON, THE HORIZON IS KNOWN AS THE C.

C_2 ... A SLIGHT LEACHING OF THE PARENT MATERIALS FORMS THE C_2 HORIZON.

C_3 ... THE PARENT MATERIALS HAVE BEEN LITTLE CHANGED. NOTE THAT THE STONE-FREE GEOLOGIC LAYERS HAVE LITTLE CHANGE SINCE THEY SETTLED OUT OF THE WATERS OF A POST-GLACIAL LAKE.

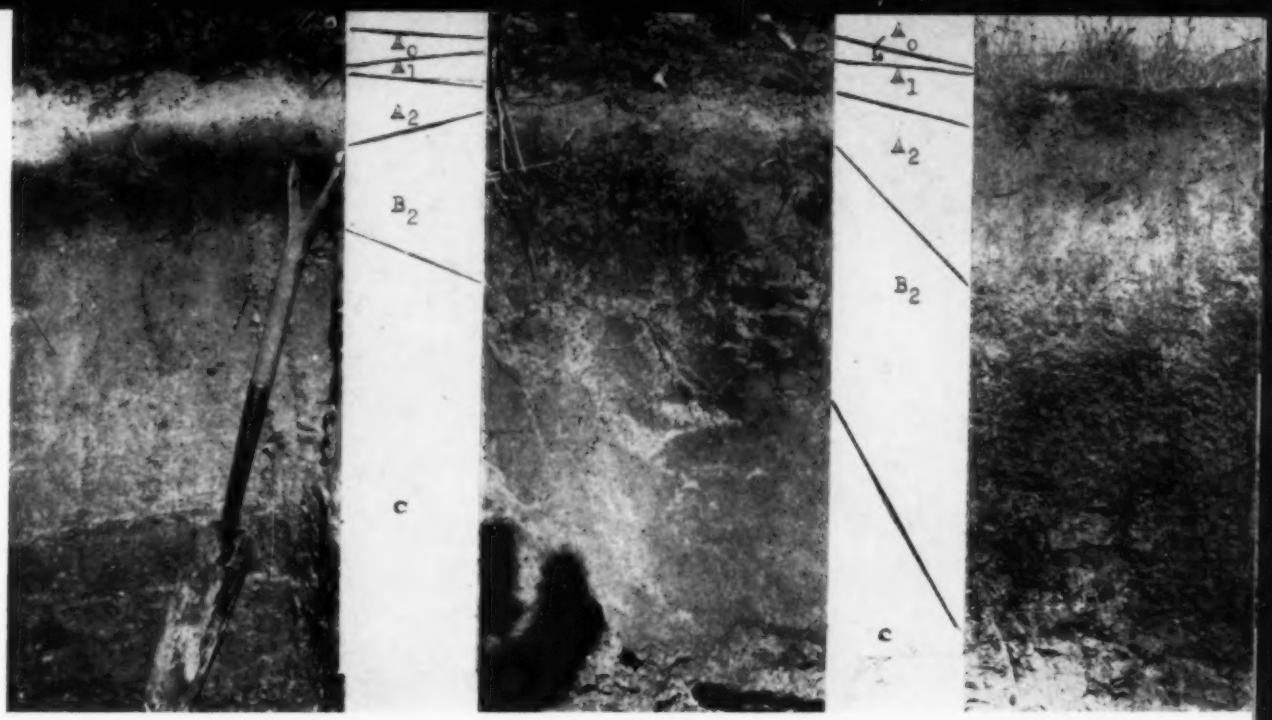
4 GEOLOGIC MATERIALS

D ... A FEW ROOTS CONTINUE TO PENETRATE THE LOWER GEOLOGIC MATERIALS. THESE ARE STONY AND UNASSORTED. SINCE THEY ARE DIFFERENT TO THOSE FROM WHICH THE A AND THE B HORIZONS DEVELOPED, THEY IS TERMED THE D HORIZON.

5. GROUND WATER

G ... AT THE POINT WHERE THE WATER-TABLE RISES AND LOWERS THERE IS A HORIZON WHERE THE MATERIALS ARE ALTERNATELY SATURATED AND AERATED. WHEN THIS FORMS PART OF THE SOIL PROFILE, IT IS KNOWN AS THE G.

SOILS ARE FORMED BY CLIMATE AND LIVING ORGANISMS ACTING UPON GEOLOGIC MATERIALS. THE PODZOL SOIL SHOWN ABOVE DEVELOPED UNDER THE ACTION OF A COOL MOIST CLIMATE AND A FOREST DOMINANTLY COMPOSED, SOUTH AFRICA, BALSAM FIR, AND ASPEN BEING THE CHIEF TREE SPECIES. PODZOL PROFILES ARE CHARACTERIZED BY AN INTENSE LEACHING IN THE A_2 HORIZON AND BY THE TENDENCY TO THE FORMATION OF AN ORGANIC MAT, THE A_0, QUITE DISTINCT FROM THE MINERAL LAYER BELOW IT. THE A_2 BEING VERY THICK. THE PARENT MATERIALS OF THESE PODZOL ARE LIGHT COLORED SILICA.



Podsol Brown podsolic Grey-brown podsolic

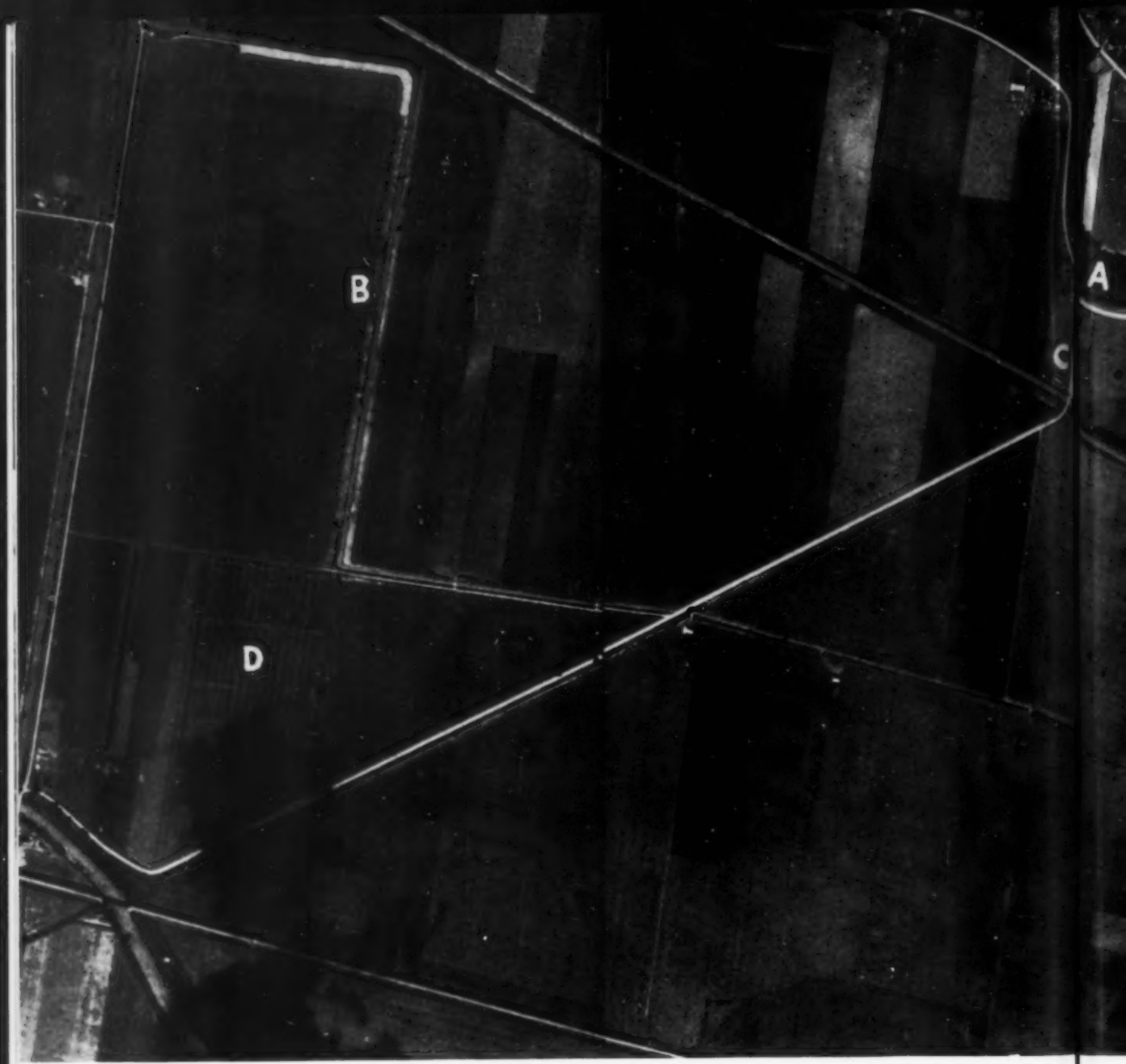
Zonal profiles from north to south showing the following variations: (1) the Ao becomes thinner, (2) the A_1 becomes thicker, (3) the A_2 becomes browner and less intensively leached, (4) the B_2 becomes thicker and more compact, (5) the whole profile becomes deeper.

Zonal, Intrazonal and Azonal Soils

Soils are broadly classified by the type of soil formation which is common on the well-drained sites within a soil zone since these reflect the normal effect of the regional climate and the vegetation associated with it. They are the normal or zonal soils. Because of local variations, the type of soil development within a zone may differ from that of a zonal soil, the degree of variation depending upon the extent to which these local influences modify the effect of climate. The site may be poorly or excessively drained or have some geological characteristic, such as a high content of lime or silica (sand) which interferes with the normal soil-weathering processes. These differences result in different types of vegetation and of soils. These are called intrazonal soils for, while they do vary with climate, they do not change to the same extent as the zonal soils and consequently may be found in more than one soil zone. Azonal soils show little effect of climate or of vegetation and consist largely of either water or rocky materials.

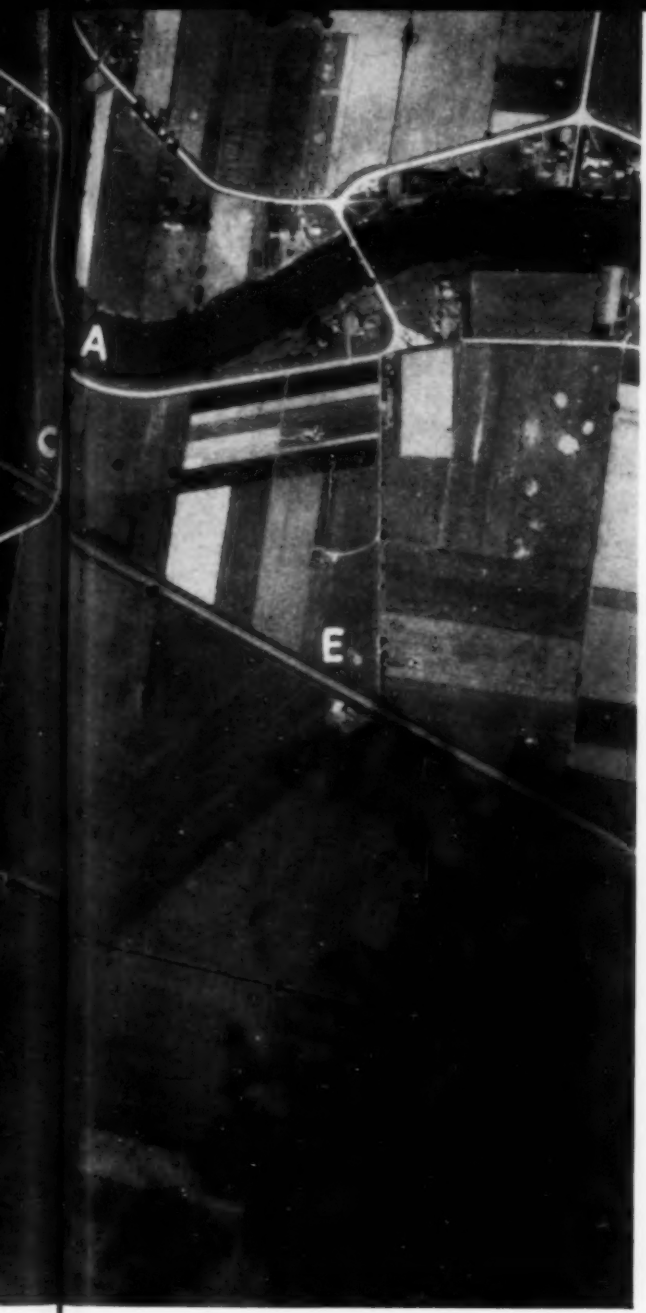
The Soil Zones of Ontario

In Ontario there are three major soil zones and several outliers of two other transition belts as shown on the map. In all of these, podsolic leaching is the dominant process in the development of the zonal soils. This type of leaching occurs on all areas where the vegetation forms an acid leaf-mat and where the rainfall is heavy enough to cause a downward movement of water through the acid, decomposing plant remains and underlying mineral materials. The water, thus acidified, removes varying amounts of iron, aluminum and other elements from the upper mineral layer depending on the type of organic matter through which it passes. Intensive leaching results in an ash-like horizon (A_2), low in iron and aluminum, and rich in silica (sand). The greyness of the leached horizon is usually indicative of the intensity of leaching. To these soils, with a grey, leached layer, the Russians have given the name podsol which means ash-like soil. A less intensively leached horizon may occur under more alkaline humus in which case the soil is termed podsolic. In Ontario, the chief variations in podsolization occur from north to south. The leaching is most intense in the podsol zone in the north and becomes progressively weaker in the brown podsolic zone and still more so in the grey-brown podsolic zone in the south. The depth of weathering, on the other hand, increases from north to south. With this



there is associated an increase in the degree to which organic matter mixes with the mineral portion of the soil.

In the poorly drained intrazonal soils where a fluctuating water-table interferes with the leaching process, alternate oxidation and reduction of the soil minerals commonly leaves the subsoil mottled with rusty brown. A greater than normal accumulation of organic matter characterizes the poorly drained soils in all the zones but the type of soil organic matter varies from north to south. The wet intrazonal soils which are associated with the podsols in the northern clay belts are covered with an organic layer known as peat which is largely resistant to decomposition under natural conditions. In the south, under similar drainage conditions, the organic matter also accumulates but tends to mix with the underlying mineral layers. This well-decomposed and well-mineralized type of organic matter (mull) is highly desirable for the growth of most farm crops. The



Rectangular field pattern on poorly drained intrazonal soils in Kent County. Though extremely heavy clay, these soils have a high organic content, and, when drained, are the most productive soils in Ontario for such crops as corn and sugar beets. Note the Thames River (A), the large drainage canal (B), the highway (C), and the network of irrigation ditches (D).

Courtesy of the Aerial Surveys Branch, Ontario Department of Lands and Forest

elm-ash lands are superior to the spruce-fir land largely because of this difference in organic matter.

The Grey-Brown Podsolic Zone

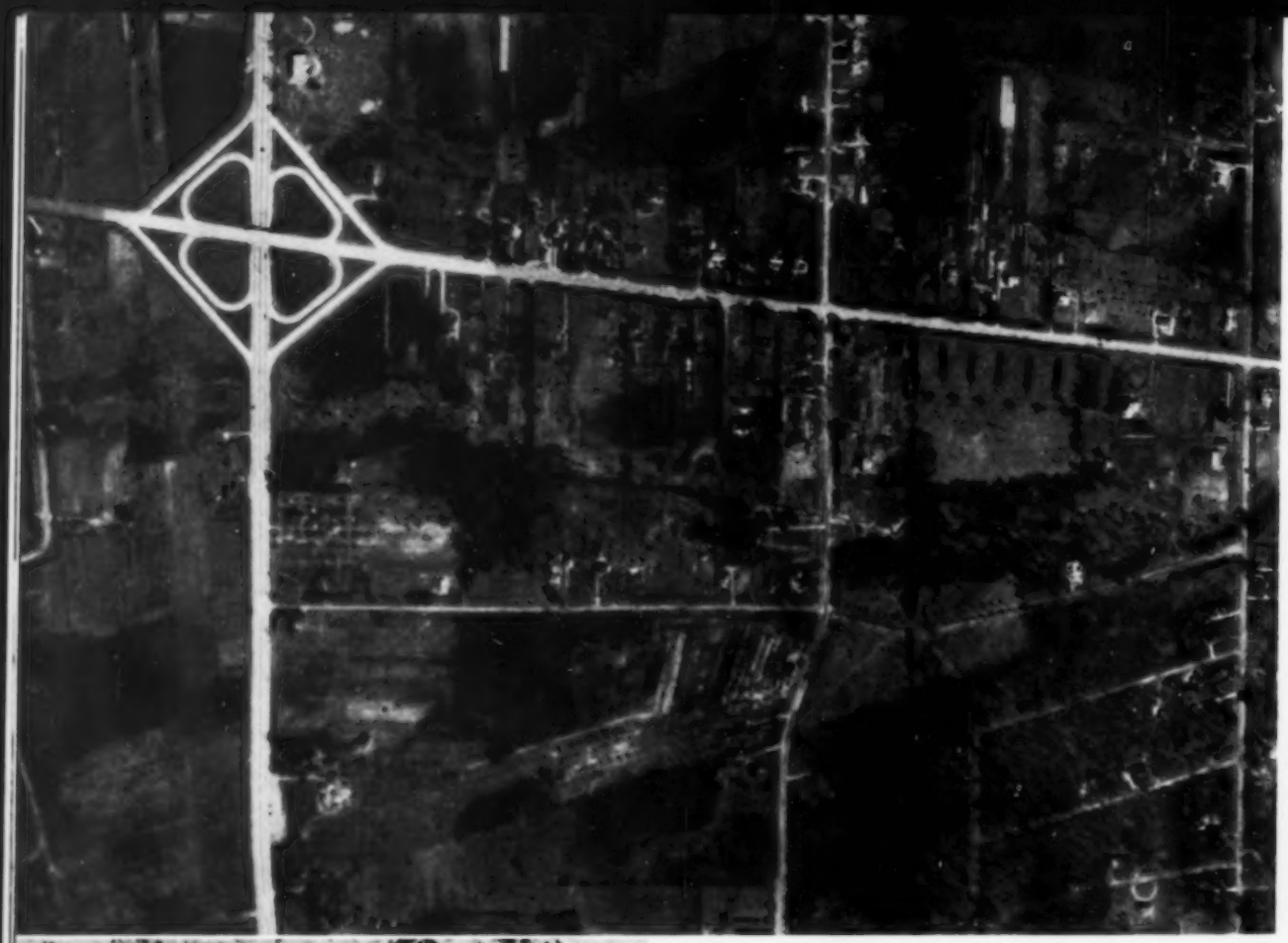
The grey-brown podsol soil zone, located south of the rocky Precambrian uplands in Southern Ontario, is a region characterized by a warm humid climate and hardwood forests. The zonal grey-brown podsolic soils are found on the well-drained locations in this zone. The organic matter of the surface soils (the A_1 horizon) is well-decomposed and well-incorporated with the mineral material. Beneath this A_1 horizon there is a deep leached layer, usually light yellowish or greyish brown in colour, the A_2 horizon. Though comparatively deep (4 to 20 inches or more), this horizon does not exhibit the intensive leaching of the podsol. A well-formed layer of accumulation (the B horizon) is usually found underlying the leached horizon. The soils on the poorly drained locations are naturally higher in organic matter which is usually well-incorporated with the mineral portion of the soil. As a rule, the lower layers are mottled indicating that the natural drainage is poor. Even on the very poorly drained locations we find that fairly well decomposed mucks are more dominant than peats.

This ease with which organic matter decomposes and mixes with the mineral soil is perhaps the most important factor favouring the agricultural development of the soils in the grey-brown podsolic zone. While this incorporation of humus (melanization) proceeds in these soils neither as far as in the prairie soils nor as far as in some of the forested soils farther south in the United States, the soil profiles, even those developed under poor drainage conditions, indicate that the general environment favours this process.

In common with the grey-brown podsolic soils of Northeastern United States and somewhat similar soils in Western Europe, this region in Ontario is characterized by commercialized types of agriculture. Too, in Ontario there are the large centres of population which are common to this soil zone. Around these centres specialization such as poultry-raising, dairying and truck gardening is common. The comparatively wide range of favourable soil and climatic conditions is responsible for a large variety of crops. Specialized crops such as tobacco, corn, sugar beets, canning crops, tree and small fruits are important in many localities.

The Brown Podsolic Zone

The brown podsolic zone, as indicated on the map, is found in the southern portion



Above:—Field pattern along the Queen Elizabeth Highway between Toronto and Hamilton—grey-brown podsolic zone. The patchy mosaic usually associated with orchard and market-garden areas is further broken by suburban subdivisions. Since these valuable sandy loam soils are confined to comparatively narrow deposits along the shore-line of former Lake Iroquois, it is unfortunate that much is now being lost to agriculture through inter-urban development which could have been planned for areas where the agricultural potential is much lower.

Courtesy of the Aerial Surveys Branch, Ontario Department of Lands and Forests

Left:—A soil profile taken in a bog in the grey-brown podsolic zone in the Ottawa Valley. While the upper portions are not well mineralized, the lower section just above the grey-blue clay is a well-decomposed muck. Drainage, careful burning of the upper peat layer, and the incorporation of muck and clay will, in time, develop productive agricultural land. The agricultural possibilities of these lands, much of which are still undeveloped, are greater than the bog soils of more northerly zones. Not all of these soils should be developed. Many are underlain by stony or otherwise undesirable materials. Others are needed for natural reservoirs. Their development depends on a well-balanced plan for the wise use of all our natural resources.

Right, top to bottom:—

An orchard area in the Niagara Peninsula. Not all these soils are zonal grey-brown podsolic soils. Because of the favourable climate it has been possible to improve imperfectly drained soils sufficiently for the economic production of peaches. As indicated by the field pattern there are heavy and poorly drained soils which do have limitations for orcharding.

A scene in the grey-brown podsolic zone near Guelph, Ontario. These are zonal and wet intrazonal soils fairly well developed.

A scene on the zonal and limy intrazonal soils of the grey-brown podsolic zone. This photograph, taken not far from Peterborough, is representative of the many productive areas of south-central Ontario.

Above:—A brown podsolic soil profile. The organic and mineral materials are fairly well incorporated in the A_1. The leached A_2 is shallower and not so intensively leached as in the podsol. The dark yellow brown layer is loose and friable and does not contain many accumulated colloids. This layer characterizes the plow soil, and it requires careful handling to keep the colloids which are present.

Top left:—A grey-brown podsolic soil profile. The A_1 horizon is fairly deep and has the organic matter well incorporated with the mineral soil. The A_2, while much deeper than in the podsol, is not ashy grey but a light yellow brown. The dark brown layer accumulation (the B) is deep.

Left:—A podsol soil profile

of the Precambrian Shield area, chiefly between Georgian Bay and the Ottawa River. It is a region of mixed forests with maple, yellow birch and pine on the uplands. In general, the soil materials are comparatively shallow over bedrock with valleys and plains of deeper sands and gravels and occasional clay pockets.

This soil zone may be considered a tension or transition belt between the podsolic soils and the true podsols. The brown podsolic soils occur on the richer, loamy uplands where there is a fairly high proportion of hardwoods. The organic matter is fairly well mixed with the surface mineral layer. The grey leached layer is commonly very thin and frequently does not appear. Not far from the surface is a darkish yellow brown horizon which shows little differentiation between the leached layers and horizons of accumulation. This layer is frequently turned up with the plow and is responsible for the designation, brown podsolic, to these soils.

On areas more poorly drained and also on those more excessively drained, both of which support forests dominantly pine, the grey leached layer is as pronounced as in the podsol zone farther north. The organic matter is not as well incorporated with the mineral layer as in the brown podsolic soils. There are local areas of more alkaline, poorly drained soils which support a large percentage of elm, ash, poplar, and other deciduous trees and in which the organic and mineral matter are fairly well mixed.

Top right:—Common vegetation on the podsol soils—white spruce, balsam fir and aspen

Bottom right:—The common tree association on the brown podsolic soils is hard maple and yellow birch.

Below:—Maple and beech are the chief tree association on the grey-brown podsolic soils.

A scene in the brown podsolic zone. The stony morainic soils covering the Precambrian rocks have been cleared and farmed. It is only by dint of extremely good management that the farmer, whose farm appears in the background, has been successful in combating erosion and, at the same time, has been able to obtain economical returns from his labours. This farmer has had an advantage in being located not too far from the markets of the Ottawa Valley. Note evidence of erosion near the farmery in the foreground.

Centre left: — A characteristic landscape in the region of brown podsolic soils near the twin cities of Port Arthur and Fort William. The parent soil material is stony, shaley loam. They are not as intensively leached as the typical podsols. The somewhat milder local climate favours the incorporation of organic matter with the underlying mineral material.

Bottom left:—A podsol soil profile on a sandy knoll from which the pine has been harvested. In the background is a stand of yellow birch and hard maple under which a brown podsolic soil has developed on a stony loam. The soil differences indicate two different sites within a short distance, a common occurrence in the brown podsolic zone.

Top right:—Poor agricultural development of good pine land. In the brown podsolic zone, good stands of pine are dominant on the sandy podsol soils in the valleys and on the outwash plains. Pines will also grow on the richer, stonier uplands but maple and yellow birch crowd them out. Because the maple on these brown podsolic soils produces inferior timber, it would seem that these uplands could be used best for hay and pasture crops and the sandy podsolic lands cropped with pine on a sustained yield basis. As indicated in the photograph, the opposite procedure has been carried out. Doubtless the chief reason is the heavy task of removing stones from the maple uplands.

Centre right:—An abandoned farm in the brown podsolic zone. Settlers on these lands are faced with clearing the land not only of trees but of stones. But, once the forests fail to supply a supplementary livelihood, it is only by extremely good management and good markets that these soils will support a full-time type of farming. It is unlikely that conditions will change for some time. Their inherent capabilities, however, suggest that a planned silvo-agriculture would use these lands to the best possible advantage.

Bottom right:—A scene on the shallow brown podsolic soils

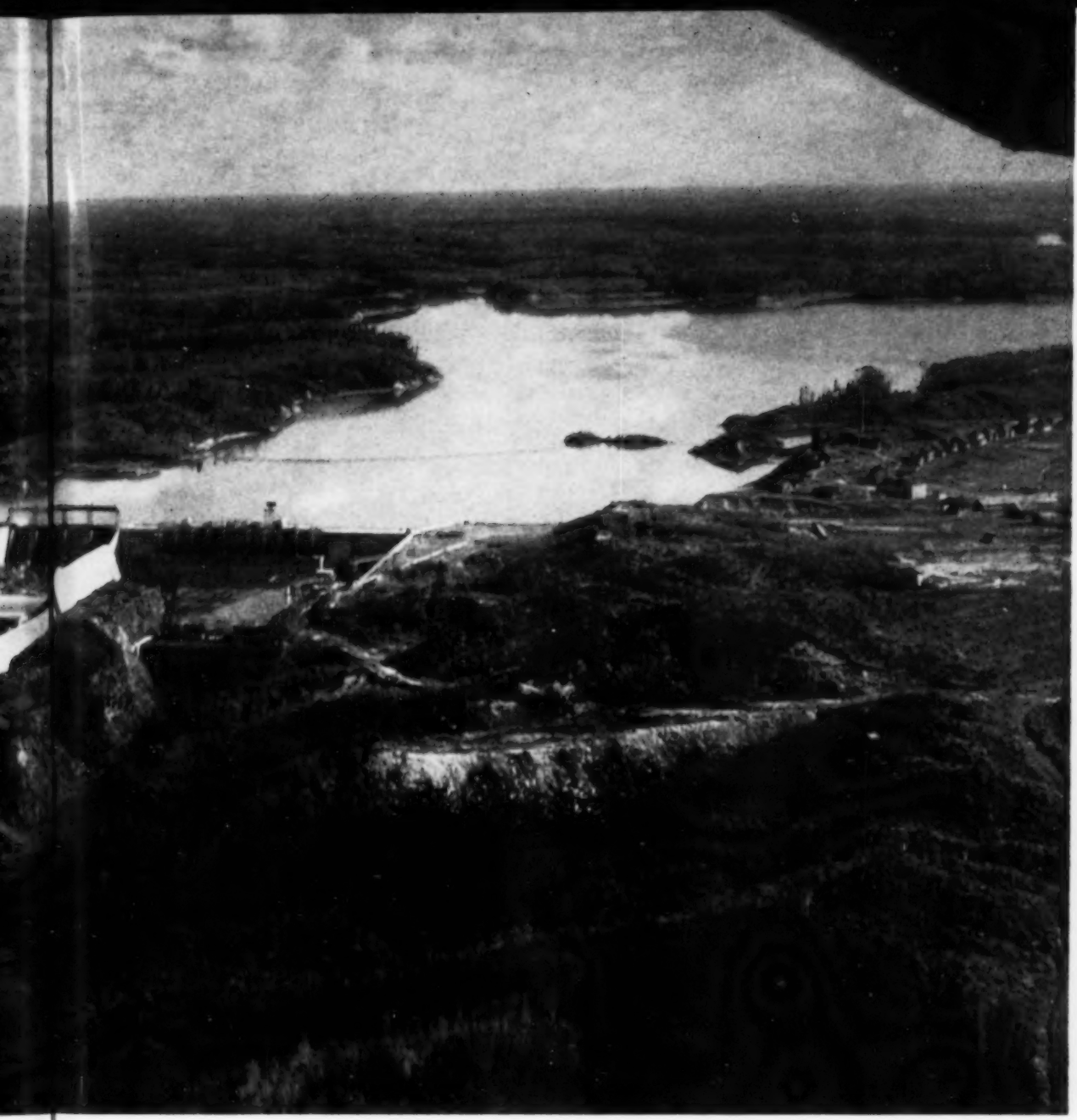
In the brown podsolic zone in Ontario, soils in which the organic and mineral matter are well mixed do not occur as commonly as they do in the grey-brown podsolic zone. But humus incorporation occurs over a range of conditions sufficiently wide to indicate that the regional climate is not particularly unfavourable to the process. On many sites, however, the establishment of a well-humified cultivated soil is not as easily accomplished as in the grey-brown podsolic zone. The generally lower supply of lime and of plant nutrients in this area also tends to increase the cost of agricultural development.

As a result of the higher developmental and maintenance costs, commercial farming tends to be less economical than in the grey-brown podsolic zone except in close proximity to good markets. In Ontario, however, this zone lacks the industrial centres possessed by similar soils in the New England States. Only in a small measure do the tourist and transportation centres meet this need for local markets.

The intimate association of podsol and brown podsolic soils with high to very high costs of development suggests a combined economy of agriculture and forestry for most of these lands. It may be said that much land in this area has already been cleared and abandoned under such a combination. But the economy that failed had a different objective than the one proposed. The land was cleared with the immediate object of supplying agricultural products to the local lumber camps and eventually to carry on full-time farming, no provision being made for the continuous cropping of forests. With the depletion of the timber came the loss of local markets and the abandonment of a land impoverished to a state where it could no longer support a commercialized type of

Deep silt deposits near Abitibi Canyon. Soils developed on these materials tend to erode easily but under careful management could support a thriving agricultural community.

An aerial view of farms in the Cochrane District developed upon zonal and intrazonal soils of the podsol zone.



agriculture. The fact remains, however, that the inherent characteristics of these soils suggest a combination of agriculture and forestry, neither of which should be based on an exploitive economy but rather on a continuous cropping plan.

The Podsol Zone

Most of Northern Ontario lies in the podsol zone. It includes the greater part of the rocky Precambrian uplands, the clay belt areas and the bog lands of the James Bay coastal plain. While zonal podsols are found in local scattered areas, poorly drained or excessively drained intrazonal soils have a general distribution. Intensive leaching occurring on all but the poorly drained locations characterizes this zone. A more widely distributed characteristic, reflecting the cool humid climate of the podsol zone, is the accumulation of a raw acid type of organic matter which forms a thin mat on the better drained podsol soils and a thick mat of peat on the poorly drained soils.

The zonal podsols have a very limited

Sawmill near Hearst. Sawmills are common in the podsol soil zone where the settlers secure a supplementary income from the forest. In the podsol zone, however, particularly towards its northern limit, saw-timber grows on the same sites as those best suited for agriculture. If agriculture is to be introduced, it would appear that these should be the lands developed, and the more poorly drained areas left to spruce.

distribution throughout the rocky uplands and clay belt areas. They are formed under a forest association of white spruce, balsam fir, and aspen on well-drained clay and loam materials. The distinguishing features of these soils are a shallow layer of raw humus not mixed with the mineral layer, and an ashy-grey leached layer (the A_2 horizon). The upper leached layers are naturally low in lime and plant nutrients. This is, in part, compensated where there is a rich limy parent material such as is found in the clay belts. Before farm crops can secure these reserves, the initial infertility of the leached horizons has to be overcome. In many respects, the better drained claybelt podsols are similar to the grey-wooded soils of the western provinces of Canada. It has been found that these grey-wooded soils require a good deal of pampering before they can be brought into profitable production and that they differ widely from the rich prairie and wooded-prairie soils found elsewhere in those provinces. They have, however, greater possibilities than the podsols developed on coarser or shallower materials. In Ontario, the better drained clay podsols have generally such a scattered distribution and are so mixed with the peaty clay soils that, except for a few selected areas, the agricultural development of the two groups must be considered together. It may be noted in passing that wherever a full-time commercial type of agriculture has been successfully set up in the northern clay belt, it is commonly these soils which have been selected through trial and error. However, many attempts to establish a full-time type of farming on even these better drained clay podsols have failed during the past decade. It would appear that future agricultural settlement should proceed under careful supervision and planned assistance.

The dominant soils in the clay belt areas of the North are poorly drained peaty clays indicated on the map as wet intrazonal soils. Over much of the area, the peat ranges from six inches to four feet in thickness and is even deeper in the muskeg areas. Although these peaty clays are dark rich-looking soils, the organic matter is not only poorly decomposed, woody and peaty material, but, under the existing climatic conditions, strongly resists further decomposition even upon drainage and cultivation. Though not so highly essential to the production of some forest

Common scenes on the poorly drained, peaty clay soils

Left:—Though these lands are the northern counterpart of the "black soils" of Kent and Essex counties, there are a number of important differences. Under the most favourable conditions in the podsol zone, the process of incorporating mineral and organic matter is slow, and, on these level impervious clays, peat accumulates readily. It would appear that the Northern Ontario clays are not a resource of a type which can be developed by the individual. Planned assistance on a national scale would seem to be required. (Note the water in the ditch and the moisture up the side of the building.) Scrubby alders replace the natural crop of pulp spruce on these man-handled lands.

Below:—Settler's home on a good road near a market

Many well-developed farms on the best land in the podsol soil zone are lying idle because of the high initial cost of development and long distances from markets.

This farm, located in the Rainy River District not far from the one above, is still worked on a full-time basis.

This farmstead is farmed part-time by its Swedish-Canadian owner and his family.

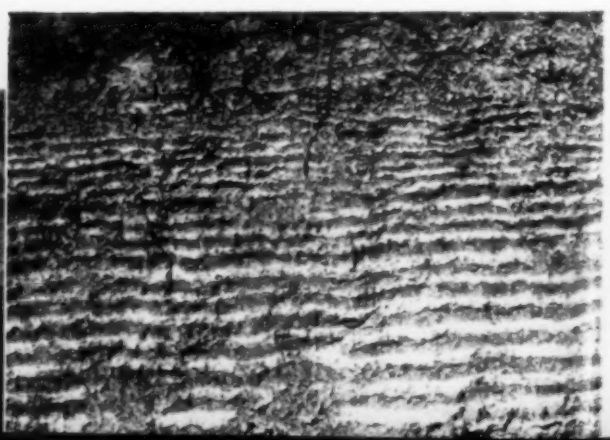
A scene on the Dominion Experimental Station, Kapuskasing, showing developed peat-glei soils. These are the wet intrazonal soils of the podsol soil zone. Even under the best management, there is difficulty in incorporating the peat with the clay to form well-humified mineral soil.

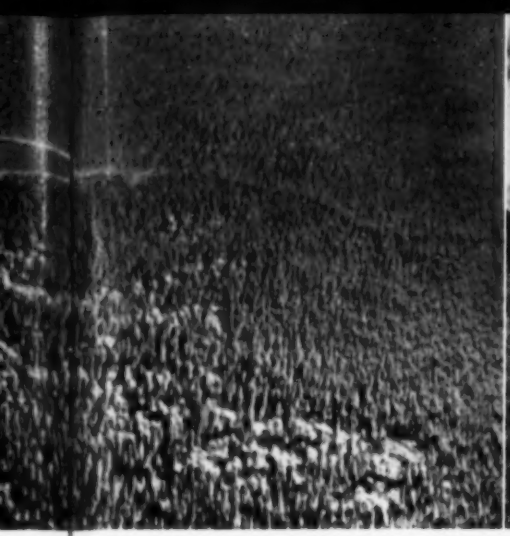
"A sea of black spruce", in the Cochrane clay

crops, such as black spruce, the break-down of organic matter is of prime importance in agricultural production. To develop a well-humified surface soil in the face of adverse climatic and soil conditions increases the cost of agricultural development. Most of the peat must be removed by burning. The heavy plastic nature of the underlying clay requires peat or organic matter in some form to 'lighten' it so that just enough peat should be left for this purpose. Not only must the soil be well-aerated, but many beneficial organisms such as air-loving bacteria and earthworms must be introduced. Even the peat soils benefit from heavy applications of farmyard manure. It furnishes not only plant nutrients which are lacking in the peat and not yet available in the clay, but supplies also the air-loving bacteria so necessary for the proper decomposition of the raw organic matter. The work of earthworms in pen-

The common profile of the wet intrazonal soils of the podsol zone is a peat-glei. The upper layers consist of poorly decomposed woody and sphagnum peat. The cool wet conditions are not favourable to the growth of bacteria and other organisms which assist in the decomposition of the peat and the incorporation of peat and mineral matter. Underneath the peat is a greyish or grey-brown clay layer, plastic when wet and brittle when dry (the glei or G horizon). The geologic materials of varved or layered clay shows slight weathering. Although these layers have a good supply of reserve minerals, they are not available to the average farm crops until the land has been drained, most of the peat burned off, and the land aerated to provide facilities for the incorporation of organic and mineral matter.

Below:—Varved clay deposits of glacial Lake Ojibway in which a varve consists of a brown clay layer laid down in winter and a grey silty clay summer layer.





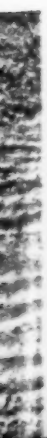
ochrane clay plain as viewed from the air.

A dairy farm developed on fairly well-drained clay in the Cochrane District. A commercialized type of agriculture may be established on the podsol clays with fair drainage, providing local markets are readily accessible.

etrating the almost impermeable clay layer (the glei), which lies just beneath the peat, can hardly be overestimated. Though the cost of liming and fertilizing these soils may not be so high as on the better drained, leached areas in the same zone, the cost of development and the frost hazard is greater. Many of these peaty clay areas are similar in respect to both soil and climate to large areas in Northeastern Russia and Northwestern Siberia. While much of the peaty clay land can be developed, in time, to support a full-time commercial type of agriculture, it would seem advisable that such lands continue to produce the fair stands of good quality spruce for which they are noted until such time as they can be economically developed for agriculture. In any case, the change from forestry to agriculture should be made gradually, as there is no apparent need for agricultural production on these lands at

Right:—In the clay belt of Abitibi County, Quebec the dredge precedes settlement.

Below:—A freshly broken field on a half-bog intrazonal soil in the podsol soil. The mosaic of white and black is not a case of combination of "the good and the bad" for both the dark-coloured, woody peat and the ashy, leached clay presents difficulties to the clay belt farmer. That this has been successfully overcome is a credit to the perseverance and the ability of the few who have accomplished it, but of little discredit to those less fortunate.



the present. Many acres which have been cultivated are now lying idle.

On the rocky upland areas, a type of podsol soil is found similar to that developed on the light, excessively drained areas in the brown podsolic zone, and, in fact, not greatly different to many of the soils common to the agricultural areas of Eastern Canada, Northeastern United States, and Scandinavia. In most of these other areas this type of podsol is largely utilized for forestry or a combination of forestry and agriculture. Only in close proximity to markets is it highly developed for a specialized type of agriculture.

Owing to the long cold winters and short cool summers, the variety of crops grown in the podsol zone is not great. Hay, potatoes, roots and pasture are the main crops. The production of grain is limited by the short season, the comparatively low soil fertility, and, in some areas, by a commonly wet harvest season. The abundant forage encourages dairying, of which market milk and cheese are the principal products. On some of the better soils close to the mining and lumbering centres, a full-time commercial type of farming has been established. But these farms do not produce one-quarter of the products consumed locally which might be grown in the region. It is true that science can greatly assist in overcoming these many difficulties, but not until there is a greater need for the agricultural products, which these immense areas could produce with improved techniques, will the pressure be strong enough to develop a research programme which will materially assist the large-scale settlement of the clay belts on a full-time farming basis. For the present, most of the land in this zone is better suited to a part-time type of farming, such as the combined forestry and farming suggested for the brown podsolic zone. It would seem wise to develop only a limited area for commercial agriculture, chiefly to take care of the mining, lumbering and tourist markets and, more generally, a part-time agricultural economy in which forestry on a sustained yield basis would provide a substantial supplementary income. It is possible that, under such an economy, homes with satisfactory standards of living and with a comparatively low investment may be established in this zone. Provision for stabilizing such an economy, however, has not yet been made.

Soils and Settlement

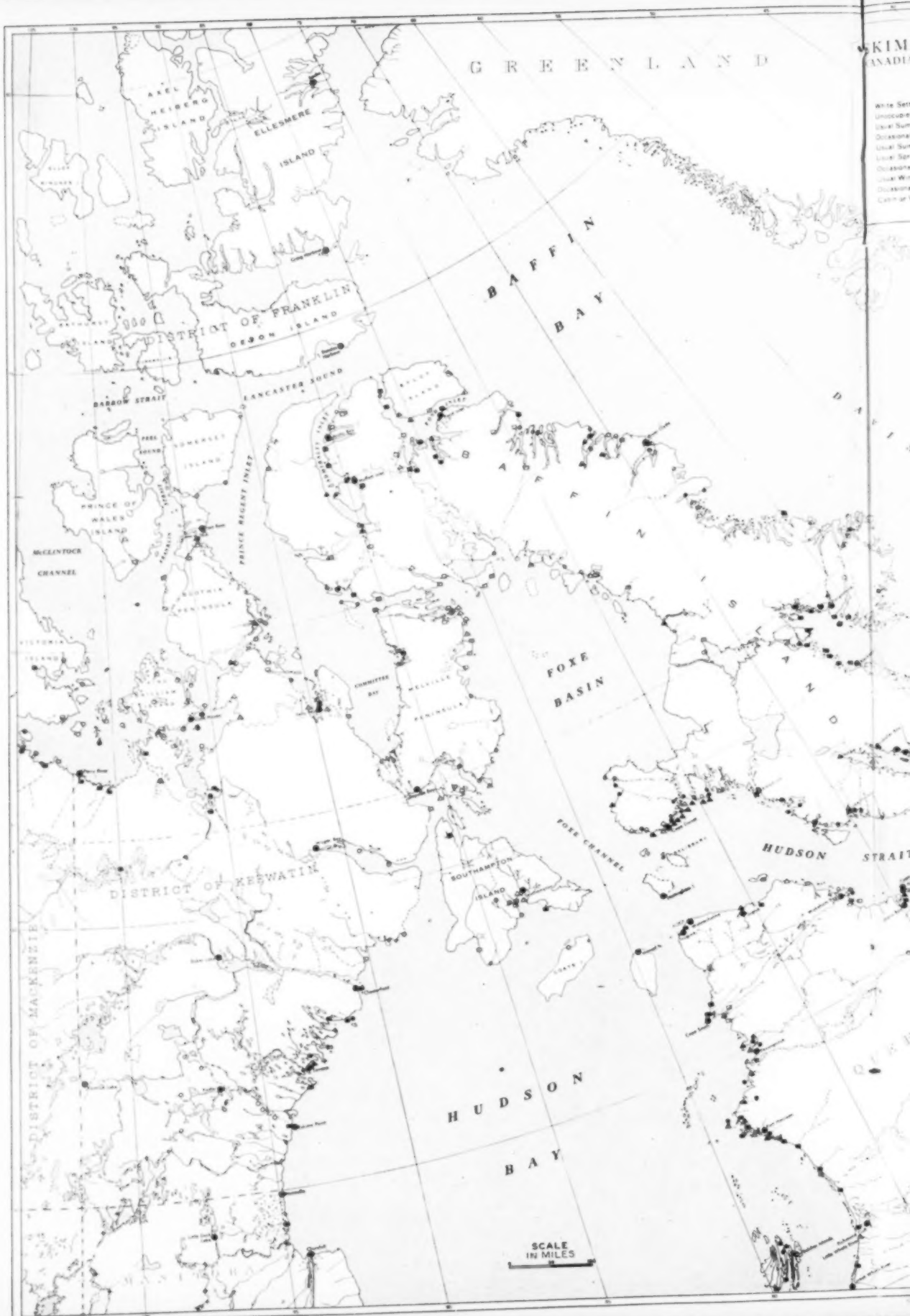
Soils, like men, are a dynamic part of the environment in which they develop, and, over which they, in turn, exert a profound influence. They are natural bodies, in whose profiles may be seen, as in a mirror, the reflections not only of the things that are and have been, but also of some of the things that are to come. In this article, the soils of Ontario have been discussed but briefly. Emphasis has been placed on the classes of soil according to the way in which they have developed in order to show the relationship of soils to climate, vegetation, and other natural qualities of land. The combination of all these factors, including soil, is the environment in which man moves and has his being. While it is this larger complex of environmental factors to which man must adjust himself during the process of settlement, soils are useful indicators of the possibilities of land. Let him, who would obtain an integrated picture of Ontario's natural environment and its potentialities, read the story of its development as written in the soil profile.

On Ontario's coastal plain, only the land near the streams is useful for either forestry or agriculture.

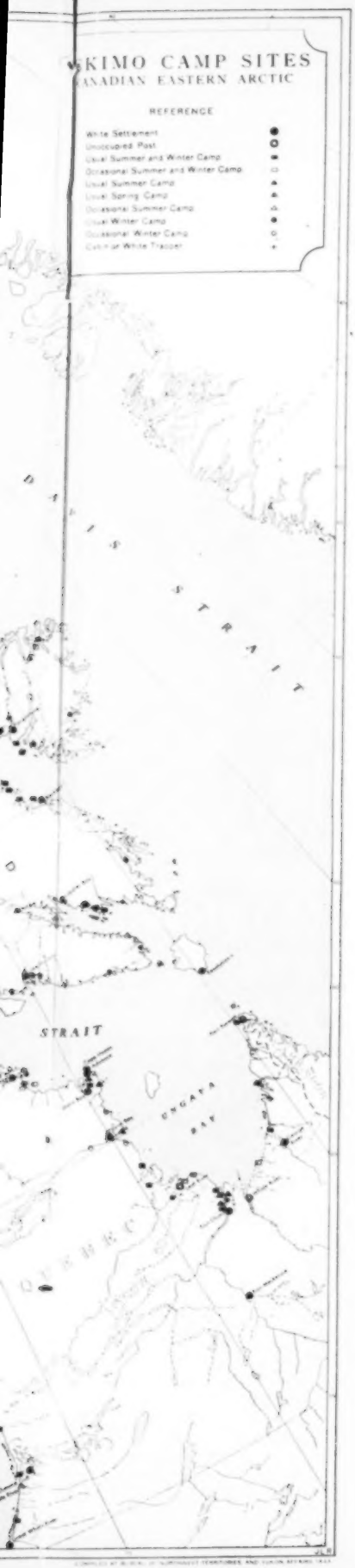
Top:—Merchantable spruce grow on the narrow well-drained fringe along the streams flowing into James Bay.

Left page:—The Hudson's Bay Company Farm at Moose Factory

Bottom:—Productive gardens on the Moose Factory Reserve



SCARCITY OF CAMPS IN THE AREA WEST OF HUDSON BAY IS PARTIALLY DUE TO LACK OF INFORMATION



ESKIMO POPULATION IN THE CANADIAN EASTERN ARCTIC

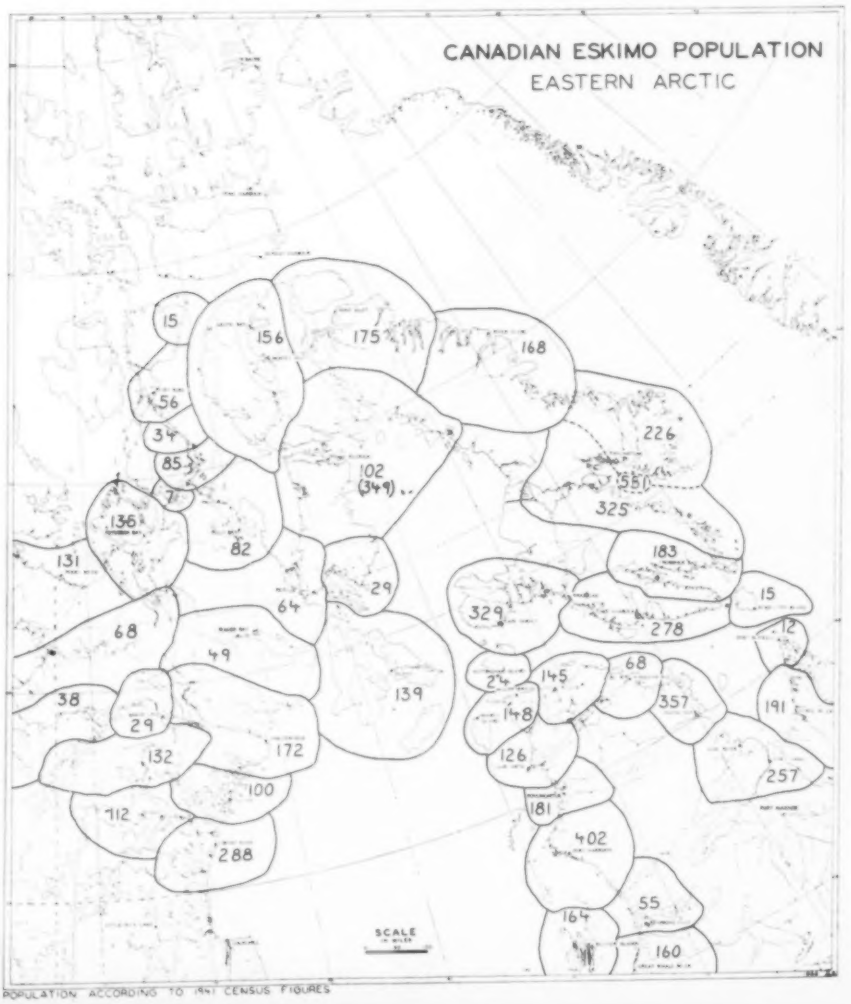
Distribution, Numbers and Trends

by J. LEWIS ROBINSON

THE Canadian Eskimo are a migratory people, scattered in small families or groups of families in the area of mainland Canada north of the tree-line, and in the treeless southern Arctic islands. At present all of the Eskimo population lives south of the wide channels of McClure Strait, Barrow Strait, and Lancaster Sound. Except for 700 to 800 Eskimo living on the Barren Lands in the interior of Keewatin District, the Canadian Eskimo is a coastal dweller. Most of his food and clothing is obtained from the sea, supplemented by the land animals which he hunts inland upon occasion.

Just as natural conditions and resources in the Eastern Arctic are different from those of the western parts of the Northwest Territories, so do the Eskimo inhabitants differ from the better-known Eskimo type of the Western Arctic. Although much has been written about the Eskimo population of the

For notation regarding map, see foot-note (2), page 134.



Mackenzie delta and Coronation Gulf area, these natives represent only about one-fifth of the total Canadian Eskimo population. The bulk of the Eskimo population lives in the Eastern Arctic, where difficulties of the natural environment limit the visits of white men to a short period each year.

The present Canadian Eskimo population is not a homogeneous people. Those of the Western Arctic have been more affected by civilization than any other Eskimo group. Many of them are relatively prosperous, wear white men's clothes much of the time, and carry on business with ease with the traders of the area. Some of the Eskimo themselves are full-time traders. The Eskimo of the area are a mixture of inhabitants of the old Thule Eskimo culture, plus a newer group who have come in from Alaska. To both has been added white blood from the people coming down to the mouth of the Mackenzie River or whaling in Beaufort Sea. The contact with civilization over the past many decades has given this group of Eskimo an outlook and culture different from that of the remaining Eskimo population.

On the other hand, the Eskimo of the Central Arctic—the area around Perry and Back Rivers, King William Island and Boothia Peninsula—have been relatively inaccessible by boat due to ice conditions

Top:—Lake Harbour pilot "Nauolio"
Photo by R. Grandy

Centre:—John Ell, native pilot for the harbour, Southampton Island

Below left:—Patsy Klengenberg and family, Fort Ross. He is a successful half-breed trader from the Western Arctic.

Below:—Unloading supplies at Pangnirtung. R.M.S. *Nascopie* in background

which impede transportation. They still retain much of their primitive culture, depending greatly upon the animal resources of land and sea for their food, clothing and utensils. The advantages and ills of white civilization have reached them to only a limited extent, leaving this Eskimo group with a type of culture and isolation similar to that of the ancient Eskimo inhabitants of the whole area.

Although it is difficult to generalize over an area as vast as the Eastern Arctic, it may be said that the Eskimo inhabitants of this region are in a stage of contact with civilization intermediate to the two smaller groups to the west of them. During the period of exploration for the illusive Northwest Passage in the seventeenth and eighteenth centuries, and through the whaling days of the nineteenth century, Europeans were visiting this region. However, the inhospitable natural environment always checked any one from staying in the area for more than a few years at a time. The Eastern Arctic Eskimo has thus been able to obtain many of the utensils and implements of white civilization, but still keeps much of his old mode of living, which is a successful adaptation to the limitations of his environment.

No attempt will be made in the following presentation to discuss the origin or qualities of the Eskimo population, since much has been written about these factors. The purpose of the introduction is to point out that such descriptions must be qualified geographically as to the area to which they refer, and to illustrate that the Eastern Arctic Eskimo differs from the native inhabitants of other Canadian Arctic areas. Much of the following information is new material which is presented as a basis for understanding the Eastern Arctic Eskimo population. In any future planning for the welfare of the native people these basic facts of distribution, numbers and trends of the population are fundamental in appreciating the difficulties of administering this region.

Present Population

As a result of the census tabulations of 1941, in which nearly all Eskimo were recorded in the census books and given a numbered fibre disk to solve the problem of uncertain spellings and the repetition of the same name within a group, a fairly accurate picture of the numbers and distribution of the Eskimo population is now available. The fact that this had not been done accurately before only illustrates the problems of trying to count a migratory people in a vast, remote and thinly-populated area. Because of the problems of limited transportation facilities to certain areas, some of the census books were not returned until the spring of 1943, and, in the case of Igloolik, the books arrived too late to be included in the final official census. When these later figures are added to the official total of 7,392, and allowance is made for the fact that undoubtedly some natives were missed in the tabulations, the figure of 7,700 is probably a fairly accurate minimum estimate of the present Canadian Eskimo population. Since they are spread over an area of 872,000 square miles north of the tree-line (exclusive of the area of the far northern islands where the Eskimo do not live), they occupy the region with an approximate density of population of one Eskimo for every 115 square miles.

Of the 5,404 Eskimo (or half-breeds listed as Eskimo) living in the Northwest Territories, 1,582 are in the Western Arctic and the remainder live in the eastern sections, serviced from the Atlantic or Hudson Bay. If one adds to this latter group the 1,965 Eskimo for whom the Northwest Territories Administration is responsible in Northern Quebec, there are about 6,000 Eskimo in the Eastern Arctic (about 80 per cent of the Eskimo population). Only 23 Eskimo are listed as living in the provinces, chiefly northern Manitoba.

Regional Distribution

The regional distribution and density of the Eastern Arctic Eskimo population may best be shown by comparing the accompanying map of Eskimo population with the following table showing the approximate number of square miles of land area and miles of coast-line available for each Eskimo. Although the natives are primarily coastal inhabitants, doing much of their hunting in coastal waters or on the strip of sea-ice along the shores, they also use the interior land area whenever possible, so that both figures should be considered in comparing relative densities of population. (*See* table at bottom of next page).

In Keewatin District there is a balanced adjustment between the population and the wild-life resources of the area. Although there is a smaller mileage of coast-line per Eskimo, probably more than half of the native population are the so-called 'Caribou Eskimo' who live inland most of the year, obtaining much of their food and clothing from the caribou of the land and the fish of the numerous lakes and rivers. This combination of inland and coastal Eskimo is possible because of the geographic character of the region, which has ample lowland area and adequate vegetative cover. The distribution of the Keewatin Eskimo is probably a wise balance of nature, and the result of centuries of living off the land. Any large increase in Eskimo population would probably crowd the region, resulting in depletion of the caribou herds, or would necessitate the importation of more white man's food, which is considered detrimental to the welfare of the Eskimo.

Southampton Island appears to be sparsely populated for its relatively large area and miles of coast-line. Much of the interior, however, is of little value because the caribou population has been almost depleted within recent years, causing the natives to obtain most of their food and clothing from the abundant sea life, chiefly along the south coast.

Baffin Island is the largest of the Canadian Arctic islands, and has a fairly large Eskimo population fringing its coasts. A more accurate picture of the distribution of this population is obtained when one realizes that two-thirds live in southern Baffin Island and many parts of the interior areas of the island are unproductive or unused. A high, rugged mountain range which extends along the northeast coast from Pond Inlet to Cumberland Sound tends to make inland travel difficult. In addition, the extensive lowland area on the central west side of Baffin Island is relatively inaccessible by foot to the native population, who would like to cross to that district in late summer when caribou hides are at their best for clothing. This relative unproductiveness, however, is balanced by the fortunate fact that Baffin Island is greatly indented with many broad bays and numerous long, narrow fiords, giving the Eskimo access to many miles of coast-line and their staple food of seal meat and fat.

Several Eskimo families from southern Baffin Island were brought into the Somerset Island-Boothia Peninsula area when the trading post at Fort Ross was opened in 1937. Here they have mixed with the more primitive people of this region, which appears to have adequate game resources for both groups. The

DENSITY OF POPULATION

REGION	Population	Sq. Miles	Miles(1) of Coast-line	Sq. Miles per Eskimo	Miles of Coast-line per Eskimo
KEEWATIN (N. of tree-line, incl. Melville Pen.)	1,400	218,000	5,400	151	4
SOUTHAMPTON Is. (incl. Coats Island)	139	18,000	1,000	130	7
BOOTHIA PENINSULA and SOMERSET ISLAND	200	22,000	1,550	110	8
BAFFIN ISLAND	2,000	200,000	11,500	100	6
UNGAVA (mainland of Quebec N. of tree-line)	2,100	92,000	3,200	44	1½
UNGAVA (incl. offshore islands of N.W.T.)	2,300	98,000	4,300	43	2

(1) The coast-line has been measured from the new 8 miles = 1 inch air navigation sheets. The total does not include small inlets or offshore islands and thus is a minimum figure. All large bays, inlets and islands were included.

Hauling white whale hides, Pangnirtung.

shores of Somerset Island and Boothia Peninsula, with an average of 8 miles of coast-line per Eskimo, present wide possibilities for food and may well be an area which will be favourable for absorbing the excess population of the more crowded sections of southern Baffin Island and Northern Quebec.

In the former Ungava District—the Arctic section of Northern Quebec north of the tree-line—it is known that relief costs are relatively high, and the welfare of the Eskimo is not as good as in some other sections of the Eastern Arctic. One of the reasons for this condition is found in the fact that there is a density of population in which each Eskimo has only 43 square miles of land area and two miles of coast. (This includes the population, area and coast-line of the offshore islands, which are actually part of the Northwest Territories.)

This region appears to be definitely overpopulated in comparison with other areas of Canadian Eskimo population, and under present game conditions Caribou have disappeared from some areas and are scarce in others, while the resources of the sea and the limited fur catch have not been sufficient to supply food to these numbers. This has necessitated the issuing of relief rations at nearly all of the posts. Although it is realized that Ungava is overpopulated, the Eskimo are human in

Eskimo handling stores at Cape Dorset, Baffin Island, after ship's departure.

Eskimo women carrying supplies.
Photo by R. Grandy

that they do not like to move to an unknown region. Thus it may be that the answer to bettering the welfare of the native people lies not in redistribution, but in attempts to increase the game supply. The Eskimo problem of Northern Quebec is accentuated by a political problem in that the jurisdiction of the Northwest Territories Administration and the Province of Quebec overlap here.

This regional survey of the distribution of the Eskimo population illustrates that they are not evenly dispersed throughout the Eastern Arctic, and thus any planning for the future welfare of the Eskimo will first have to consider areas of greatest density. Even within the local regions, however, the Eskimo are a fluid, migratory people, moving from one seasonal camp to another. Their seasonal hunting and trapping activities, which are co-related with the habits of the local wild life, make them a difficult people to whom to bring education and medical attention. A more accurate picture of the distribution of the Eastern Arctic Eskimo population may be obtained from the accompanying map* of Eskimo camp-sites, which shows the position and type of Eskimo camps as of 1943. (2) A discussion of the function of these camps illustrates the general seasonal round of activities of the native population.

Eskimo Camp-sites and Seasonal Activity

Although no Eskimo camp-site may be classed as permanent or certain, there are some places where the camps are used throughout the year and they usually remain in the immediate vicinity of some favourable hunting spot for several years. Although some of the families, or members of a family, may be absent from it for a time, there is usually some one there. Such camps are the closest approximation to a 'native village' that these migratory people have. They are quite common in the Cumberland Sound area and in northern Baffin Island, where they may contain anywhere from 20 to 50 Eskimo during certain periods. There are other camp-sites, which although in sufficiently favourable hunting areas to be used in both winter and summer, are only used occasionally or in alternate years. These are called occasional summer and winter camps.(3)

Usual summer camps are generally found at the same place for several years in succession but during the summer only.(4) They are quite often located on offshore islands or at the mouths of rivers, as illustrated in the Cape Dorset area and along the east coast of Hudson Bay. If the camp is on an island, it is from here that the Eskimo hunter pushes off in his wooden boat or skin kayak to hunt seals or walrus for his summer's food and winter's oil and dog feed.(5) A summer camp at the mouth of a river is so located as to permit fishing there in July when the fish are going out to sea, and again in September when they are running upstream to the interior lakes. Sometime

(2) Information for the Eskimo camp-site map was gathered during the summer of 1943 chiefly by Lt. A. L. Washburn, Arctic Section, A.D.T.I.C., U.S. Army Air Force. He was assisted during the first half of the Eastern Arctic Patrol by Lt. T. H. Manning, R.C.N.V.R. on loan to the N.W.T. Administration, and by J. Lewis Robinson, geographer for N.W.T., on the last half of the patrol around Baffin Island.

The camps were plotted on large 8 miles = 1 inch work maps by the traders, missionaries, policemen and some Eskimo at each post, and for any additional area with which they were familiar. Since it was planned to use the data for rescue work and information for flyers who might be in that area, care was taken to see that the camp was located as accurately as possible. Only those camps were used for which there was a good possibility of some one being at the camp at the season named. Information obtained for the east coast of Ungava Bay and the west coast of Hudson Bay was incomplete. The location of additional camp-sites in the King William Island—Perry River area was supplied by the Hudson's Bay Company from Winnipeg.

A new base map of the Eastern Arctic was compiled and drawn up by the author at the Bureau of Northwest Territories and Yukon Affairs in Ottawa. It included all of the latest map and aerial photo information which was currently available. The camps were then plotted on this base by the author and sent to Lt. Washburn in New York for checking before being printed and reduced to the present scale.

(3) The occasional camps in the Igloolik area are so classified because of the uncertainty of the status of the camps since the closing of the trading post in 1942. The mission is still open there.

(4) Summer camp-sites which are less regular in location from year to year are designated on the map as occasional summer camps.

(5) The modern Eskimo boat, usually commercially manufactured, is equipped with a gasoline motor and the Eskimo makes a good mechanic. The skin kayak is little used on the west coast of Hudson Bay.

*See map on first page of article.

Eskimo sledge dog, Cape Dorset, Baffin Island

Native camps at Pangnirtung
Photo by Eric Fry

Camp at old abandoned Eskimo village of snow houses, Catherine Bay, Hudson Strait

Eskimo skin tent, Pangnirtung
Photo by Eric Fry

Native family in whaleboat at Lake Harbour

R.C.A.F. photo by Eric Fry

during the late summer period some of the group will pack their skin tents, carry a supply of food, and go inland to hunt caribou, the skins of which will later be made into winter clothing by the women.

The chief event of the summer is the coming of the annual supply ship. This occurs at approximately the same time each year, and varies from mid-July to mid-September, according to the position of the settlement on the route of the Eastern Arctic Patrol. About 'ship-time' the natives begin to move toward the post from scores of miles along the coast. It is a happy, carefree holiday for them as they put on their best clothes and manners to greet the white visitors and officials. It means an annual reunion—a chance to visit friends and relatives from other camps and to tell and be told the news of the past year. They help to unload the barges which lighter supplies ashore, and in return are paid in rations by the trading company while they are at the post. Within a few days the year's supplies are piled up on the beach and in the warehouse; the ship's whistle blasts a farewell, and the Patrol ship moves slowly out of the harbour, not to be seen again for another year.

In the Eastern Arctic, winter camps generally consist of dome-shaped snow-houses which can be constructed out of snow blocks by an expert Eskimo within an hour or so. They are left unoccupied when a family moves out and a new house is built at the next camping spot. There are certain locations, however, which are favourite hunting or trapping grounds, and at which 10 to 30 Eskimo may be grouped during most of the winter. It is quite probable that all will not be there at the same time, but that they will come and go as fancy or necessity demand. If the same place is chosen for several years the site becomes a usual winter camp, but if the camp-site varies from year to year it is an occasional winter camp. From these winter camps the Eskimo hunters go out on the sea-ice to wait patiently at breathing holes to harpoon or shoot seals, or in the spring to steal up within shooting range as the seals bask in the sun at the floe edge. Some winter camps may be located on the shore of an interior lake, where the family will fish for long weary hours with a hook or net through a hole in the thick ice.

Winter camps are also situated on a trap-line, and from mid-November to the end of March, when the open season for foxes ends, the Eskimo periodically visits his fox traps. The fox skins will later be brought into the post to be traded for the goods and necessaries which the white man has brought into his life. The Eskimo's prosperity will vary with the fox cycle, which is one of plenty about every four years. His catch will also depend on how much time he has to spend hunting seals or fishing for food. If he has a bad year he will be forced to ask the trader for credit to supply himself and his family with food until the next season.

There are other camps which are called spring camps.(6) They are usually well-

(6) Although these spring camps are found under winter conditions they are usually unoccupied for half of the season and could not be classed as winter camps with the expectation of finding some one there most of the winter.

Finish of kayak race, Port Burwell

known and excellent spring sealing camps, and are well illustrated in northern Baffin Island and along the east coast of Hudson Bay. The spring camps supply food for that season and also much material for summer clothing, which is principally sealskin for boots and pants, and sometimes parkas. Late spring is usually a happy time in the Eskimo's life. The days become longer and warmer; birds begin to return and add variety to their diet. Food is generally plentiful and the Eskimo has a chance to relax after a long winter of hunting and trapping.

Since the Eskimo population of the Eastern Arctic attempts to support itself from its environment, much of the distribution of the native people can be correlated with areas of abundance of wild life. Most of the natives are coastal dwellers because the food of the sea is more abundant and reliable than that found on the land. Just as the game of the land and sea is continually moving to find sufficient food, so is the Eskimo population a migratory one, with certain regional areas of density within which there are local movements and fluctuations. These habits, which are an adaptation to the limitations of their natural environment, bring forth many problems in administration and welfare. To approach these problems intelligently one of the prime requisites is to know the facts of where the natives may be, in what numbers, and what are their seasonal activities.

Trends

It is difficult to state exactly how much the Canadian Eskimo population is increasing, since available vital statistics are admittedly incomplete. These returns are submitted annually by the Royal Canadian Mounted Police detachments at various Arctic posts, and were especially poor in the early years when the Eskimo had less contact with government representatives. Certain trends and percentages, however, give an indication of the status of the population, and since they are all the figures that are available, it is the best that can be done.

Some authorities believe that the Eskimo population has declined greatly since the coming of the white man; and this is probably true if they have followed the pattern illustrated by the contact of other native peoples with civilization and its diseases. It seems quite probable that before the whites came upon the scene there would be a balance achieved between the population growth and the game resources of their inhospitable land. Infant mortality, and starvation when their primitive weapons failed to kill enough game, would be positive checks upon the population. When white men first began moving into the Arctic regions, the contact with the diseases of civilization, for which the Eskimo had no immunity, would certainly kill off numbers of their population. However, early statements concerning the

Below:—"Kasito", Cape Dorset, Baffin Island

Above:—Grandmother, daughter and grandsons. Natives of Cumberland Sound camp

Left to right:—William Duval's eldest daughter, his widow (totally blind), Al-ook-ee, Duval's youngest daughter

Eskimo population, based on numbers of these migratory people met at various scattered places, may be misleading, and it is only within the present century that estimates have become more accurate.

Along the coasts of the Western Arctic evidence points to the fact that the Eskimo population has declined within the past forty years. There now appear to be fewer people in the interior Barren Grounds since the time of Rasmussen's Fifth Thule explorations (1922—24).(7) Whether this has been an actual decline, or simply that the people have shifted to the coasts to be nearer the trading posts, is difficult to determine from our present knowledge. On Baffin Island, on the other hand, Major

(7) Kaj Birket-Smith. *The Caribou Eskimo. I-II.* Report of the Fifth Thule Expedition. Vol. 5. 1929

Below:—Kaoomoo, old Eskimo, River Clyde
Photo by R. Grandy

Native women resting in front of Hudson's Bay Company warehouse, Wakeham Bay, Quebec.

Burwash, special investigator for the Northwest Territories, estimated that the Eskimo population was 1,800 in 1925. The present population of 2,000 indicates that these people have been able to carry on adequately. Over the whole Arctic area there has been an increase on paper since the 1931 census, which listed the Eskimo population as 5,979; but at that time it was realized that the figure was incomplete and in many cases was only an estimate.

Although the present available statistics can only indicate the present and recent-past status of the Eskimo population, it would seem that the present-day natives, armed with more efficient weapons and importing outside food, should be able to maintain themselves against the natural

Below:—Eskimo family, Southern Baffin Island
Photo by Eric Fry

Below:—Eskimo woman, "Pitulala", Lake Harbour, Baffin Island

Above:—Sarah (daughter) and Maggie (mother, seventy years), at Wolstenholme, Quebec
Photo by R. Grandy

rigours of a poorly productive country. Total births and deaths for the period 1927—43, as shown in the table, on opposite page, indicate that the Eskimo population is slowly increasing at the rate of one per cent annually. (8)

Birth rates are fairly high among the Eskimo. During the period 1936—40 the average annual birth rate was 35 per 1,000. This compares favourably with the lower rates of 20 births per 1,000 for all of Canada during the same period. Of the recorded births during the total period 1927—43 it is found that 54 per cent of the births were males, with male births being slightly predominant at each of the areas from which statistics were sent. The accompanying chart of Eskimo births by months illustrates that the three winter months of January, February and March have the highest number of births recorded, while fewer births have been noted in the autumn. It would thus appear that the period of greatest fertility occurs in the spring when living is easier and food generally more plentiful than during the difficult winter months.

Infant mortality is usually high among primitive people, but with the present Canadian Eskimo it is not as serious as one might expect, despite their lack of modern medical facilities. Records show that infant deaths (under one year)

---

(8) These figures include data from areas tributary to Baker Lake, Chesterfield, Lake Harbour, Pangnirtung, Pond Inlet, Cambridge Bay and Coppermine. Also shorter term data from Eskimo Point, Southampton, Foxe Basin, Dundas Harbour, Craig Harbour and Bache. The total Eskimo population of this region is about 4,500.

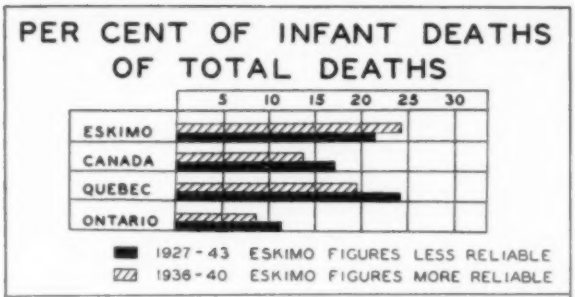
Top to bottom:—

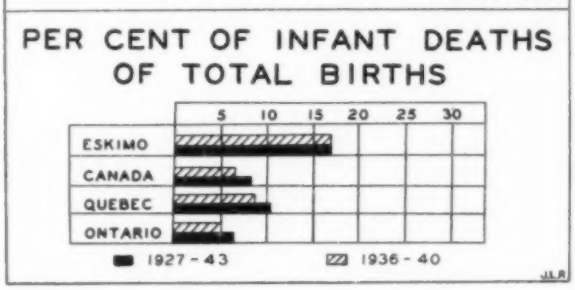
Eskimo spearing Arctic char, fish trap, native encampment, Boothia Peninsula.

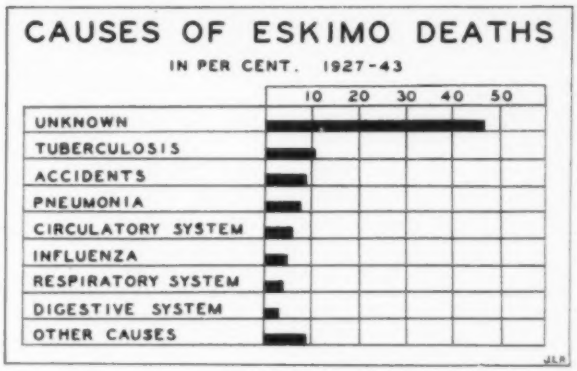
Party of natives skinning ptarmigan, Terreokjuk, Baffin Island.

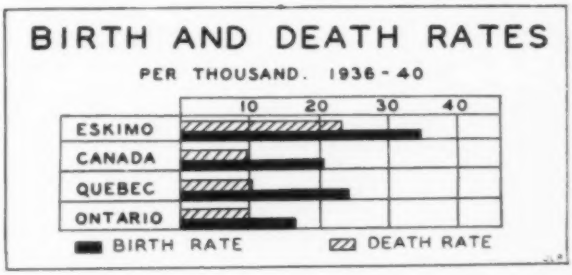
Cleaning and drying sealskins.
Photo by Eric Fry

Eskimo woman cleaning blubber off skin of white whale at Pangnirtung, Baffin Island. Employed by Hudson's Bay Company.



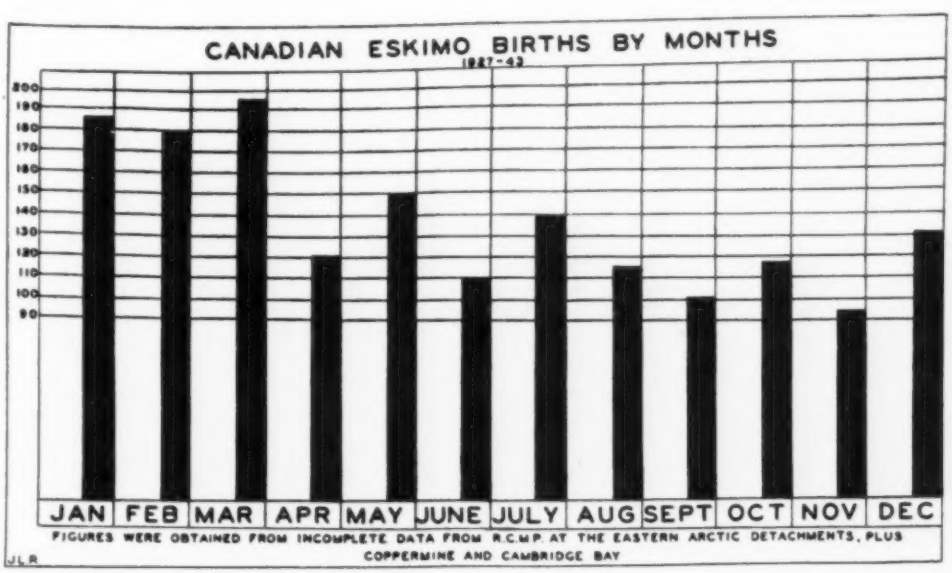






constituted 21 per cent of the total deaths during the period 1927—43. A more reliable figure is obtained from the Eskimo

	ESKIMO BIRTHS			DEATHS						
Date	Male	Female	Total	Still births	0-6 months	6-12 months	Total infants	Others	Total	Net increase
1927-43.....	970	814	1,784	28	167	107	302	1,132	1,424	360
1936-40.....	...	...	787	12	80	42	134	409	543	244



records of 1936—40, in which infant deaths were 24 per cent of the total deaths. The accompanying chart* compares these figures with percentages for the rest of Canada, and illustrates that although the Eskimo death rates are higher, they are not excessive. The infant mortality problem, however, becomes more serious in comparison with the rest of Canada when one discovers that Eskimo infant deaths were 17 per cent of the total births during both periods of 1927—43 and 1936—40. These figures indicate that for every 100 Eskimo births an average of 17 die before they are one year old.

Death rates are also high in the Eastern Arctic. In the five years, 1936—40, when Eskimo statistics are more reliable, the death rate was 23 per thousand. (The average for Canada was 10 per thousand.)

Since the last complete census in 1941, the records are too short to prove anything concerning the status of the population, but they are valuable in completing a statement of the known facts. There have been 268 births in the Eastern Arctic (including incomplete returns from Northern Quebec), which is about normal and maintains the high Eskimo birth rate. The most serious problem facing the Eskimo population, however, is the sudden appearance of epidemics which wipe out numbers of their population in local areas. Since 1941 several epidemics have been chiefly instrumental in causing 304 deaths in the Eastern Arctic and thus actually reducing the population by 36 persons. In the Western Arctic there were 79 births recorded and only 51 deaths, which has meant an increase of 28 Eskimo since the 1941 census.

Although vital statistics returns, the only actual data which can be used, show that the population on the whole has slowly increased in the years since the Administration of the Northwest Territories has taken an active hand in overseeing the welfare of the Eskimo, it may justly be said that prior to 1941 the actual numbers of the Canadian Eskimo population were not known, and so any statement concerning the increase or decrease in population cannot be based on completely valid facts. However, the known figures which indicate a slow increase are what might be expected with modern medical assistance and more efficient hunting weapons. The limitations in the natural environment of the Eastern Arctic prevent any rapid increase, since the region cannot support a large population under present game and food conditions. Regardless of how indications of past trends may be interpreted, a fairly accurate picture of the numbers and distribution of the Canadian Eastern Arctic Eskimo population is now available so that it can be watched with a critical eye in the future.

*See page 141

Published with the permission of the Director, Lands, Parks and Forest Branch, Dept. of Mines and Resources, Ottawa.

Government-supported hospital of Anglican Mission at Pangnirtung, Baffin Island, Northwest Territories

R.C.A.F. photo by Eric Fry

POLAND IN THE EUROPEAN BALANCE

by **BERNARD TROTTER and J. W. WATSON**

THE recent drive of the Russian forces into Poland has precipitated another of the boundary problems which have always been latent in the geography of Eastern Europe. Once again, the three nations of the North European Plain, Germany, Poland and Russia, are caught up in "the human struggle to find limits where nature has set none". There are no marked physical features to separate their respective spheres. If anything, topography and climate only serve to obscure the differences, and it has been left to history, economics and military strategy to distinguish between the nations.

Fig. 1

The physiography of Poland. Note the way in which the political boundaries transgress the physical features in all parts of the country, except the south. The geography of Poland makes it transitional between Baltic and Black Sea and Danubian lands, and also between the western and eastern lands of the Northern Plain. The coast is transitional between the east-west trends of Germany and the north-south trends of Sweden; the glacial depressions or urstromtaler connect the Vistula Basin with German and Russian river systems; the Loess Lane reaches along the southern foothills without break from the Ukraine to Silesia, Saxony and western Germany; the Silesian Coal Basin is one of a long string of such basins, lying in the great Carboniferous Trough, from Belgium to the Donetz coalfield; while the mountains to the south mark a common front between the Danube lands and Northern Europe. Thus, in each of its features, Poland is integrated with external regions. Note, in particular, the four great gateways into the country from the Russian plains, the Danube lands and the Baltic Sea, and the indeterminate frontier along the German border.

This is especially true of Poland. In its very geography it is a Transition State (*see Fig. 1*). Indeed, relief and climate had partitioned it long before politics. Thus, lying on the divide between the Baltic and the Black Seas, it was almost inevitable that it should become subject to the intervention of Sweden and Turkey; at the same time, placed in the east-west glacial depressions of the Northern Plain that run across the continent, it was involved in both Prussian and Russian ambitions. Even the apparent unity of the Vistula Basin has been ineffective, since the upper waters transgress upon the Moravian Gate, to engage with Austrian interests, while the famous Polish Corridor has proved more of an invitation to conflict than an opportunity for contact with the outer world.

It is not surprising, therefore, to learn that the territorial claims of each nation are based rather upon strategic and historical arguments than upon strictly geographical ones. Such appeals are inherent in the amorphous geographical situation. With no divide between themselves and the Germans, but, on the contrary, with intimate connections joining their river systems, the Poles fear "the jaws of the German hound", those fatal pincers of German Pomerania and Silesia that squeeze the heart of Poland. They hope to escape by widening the Corridor and taking over the Silesian Basin. In the same way, lacking any physical frontier with Russia, they have sought to secure their eastern approaches by the control of the Vilna and Lemberg gateways, well to the east of the Polish homeland.

The Germans counter such claims with like strategic claims, maintaining that the Corridor frustrates the political unity of the German plain, and that Silesia is an integral part of their economic order. More than that, if we interpret their geopoliticians correctly, they regard it as their destiny to control the four great geographical resources of Northern Europe; namely, the Baltic coasts, the Northern Plain, along with its strategic river crossings, the Loess Lane, that skirts the Central Uplands and is invaluable for agriculture, and, finally, the Coal Trough, extending from Westphalia to the Donetz

Fig. 2

The outward expansion of Poland, making use of the centrifugal political forces latent in the Polish role as the great crossways of Eastern Europe. This expansion began as early as the tenth century, and continued with intermittent success up to the eighteenth century, exploiting the entanglement of Prussia with Austria and with France, and the conflict between the Russians and their various enemies, Tartars, Turks and Swedes. The chief geographical controls of Polish (and Lithuanian) expansion are suggested in the Corridor, the Posen and Cracow salients, and the Vilna and Lemberg gates.

Basin. The continuation of these four strategic belts through Poland has been a recurrent excuse for German aggression.

As for Russia, it is well aware of the fact that a strong Poland is a first-rate defence for its western border, provided that each country respects the other's interests. But, at the same time, Russia's freedom, depending, as it does, not upon size, but upon accessibility, demands the protection of those gateways into its heartland which open from Poland. And since war is more than ever a mobile affair, Russia needs the possession of a zone of manœuvrability along the western marshes to give it adequate depth for its defences. And because the population of this area is predominantly White Russian or Ukranian, and the rest of these national groups are already within the Soviet Union, Russia is persuaded that its demands are not exorbitant.

This story of claims and counter claims is not a new one. Eastern Europe, and especially Poland, has long been a centre of changing frontiers. Time and again centripetal forces, working from outside, have thrust all manner of men and ideas into this area; congestion has then grown up, leading to opposite centrifugal forces and violent expansion away from the centre, as seen in the rise of the Polish-Lithuanian empire.

As a result, the location of Poland, at the point toward which the inward forces drive, and from which the outward ones move, has always proved a dangerous liability in times of political weakness or stagnation, though a challenging asset in times of unity and development. When the Teutons were immobilized in the West, during their struggles with France or Italy, and again, when the Russians had to turn east to ward off the Tartars, the centrifugal forces reached their height in the expansion of Poland from the Baltic to the Black Sea (*see Fig. 2*). But when at length the Prussian drive to the east began, in quest of a continental empire, and Russia's no less spectacular drive to the west took place, in search of maritime power, Poland was caught up in the centripetal storm and disappeared from the map of Europe (*see Fig. 3*).

Fig. 3

The collapse of Poland, as the external political forces drive inward into the Polish crossways in a great centripetal storm. The double line shows the extent of Polish possessions at various periods; the broken lines represent the encroachment of the foreign powers, from the eleventh to the eighteenth centuries. After Sweden and Turkey, from north and south, had endangered the Vistula-Dniester axis, the famous tripartite division of the county between Prussia, Austria and Russia took place, along the axis of the Plain. Regions left blank, such as Livonia and Podolia, were seized by a succession of powers.

The collapse of Poland was due to the fact that this outside geographical pressure was able to exploit an inner historical weakness. An early repudiation of primogeniture had led to a fundamental dynastic instability which prevented the consolidation of the territories won by the Poles. Foreign-born monarchs involved Poland in foreign causes. For example, Casimir III unfortunately chose the Prince of Hungary as his successor. The weakness of Poland under the latter ruler led directly to a dynastic union with Lithuania. After the Polish-Lithuanian state thus created had spent itself on vain ambitions in the East, Polish allegiance to the Roman Church promoted hostility with Russia, where the Orthodox religion persisted. Poland became "an outpost of Catholicism between the Lutherans of the plains to the west, and the Orthodox people of Eastern Europe". Religious differences were added to dynastic divisions, resulting in anomalous situations such as that in which the first Swedish king of Poland, Sigismund III, strengthened the Catholic Church preliminary to his attempts to regain the throne of Sweden, which was by this time predominantly Lutheran. Poland was thus induced to represent itself as a Baltic power, and consequently invited the counter-attempt by Sweden to conquer Poland. The struggle was made all the more bitter by the economic policy of a continental power securing access to the sea, and of a maritime power seeking expansion into the hinterland.

In the same way, the chaotic rule of the Saxon kings of Poland laid the country open to the growing influence of Russia under Peter the Great and his successor Catherine. By this time the means of communication had improved to the extent of making Poland the great crossways of Eastern Europe, and of inviting counter-invasion into the Polish plain. Prussia, as well as Russia, became bolder in the violations of Polish neutrality during the wars of the eighteenth century. Indeed, Prussia, as yet not conscious of its opportunities in Western Europe, and still wary of the power of the Empire, looked to the establishment of its particular sphere of influence precisely across the Polish plain. Watching the thrust and counterthrust of the two great northern powers was Austria, jealously guarding the European balance from its position between the West and the East. At last mutual jealousy resulted in the adoption of partition as the plan to resolve the strategic differences dividing the Great Powers. Austria—to protect its mountain rim, Prussia—to unite its extended possessions, Russia—to guard from the flanks its cherished footholds on the Baltic and the Black Sea, each and all required a sphere in the Polish bufferland. As for Poland, already weakened by the aggression of a Sweden out of the North and a Turkey from the South, it was unable to hold the balance between the West and East, and was finally occluded in 1795 (*see Fig. 3*).

During the century that followed, the Polish people found themselves in three very distinct governmental and social environments. In Russian Poland, the revolution of 1830 ostensibly freed the Tsar from the obligations imposed at Vienna, and a policy of ruthless suppression was adopted. Later uprisings in 1863 and 1904-5 were suppressed with equal severity, and although the Poles were allowed to play an important part in Russia's economic life, they were granted no form of political autonomy. The Prussian attempt to consolidate its Polish possessions was even more thorough. Not only did the Prussians repress the revolutions of 1846-8 with great bitterness, they also tried to Prussianize the Poles. Bismarck carried his Kulturkampf against the Polish Church, and Bulow intensified the policy of economic and educational penetration and subjection. These measures only served to awaken a powerful though sometimes latent resistance on the part of the Poles, who came to regard the Prussians as their worst of enemies.

Austrian Poland suffered similar repression to begin with, but the defeat of Austria at the hands of Prussia, in 1866, forced the Empire to adopt a conciliatory attitude toward the Polish elements within its borders. Consequently, it set up a self-governing Galicia within the imperial framework. It is not surprising, therefore, that the hopes of Polish unity centred in Austrian Poland, and that the Prussian and Russian Poles should look here for the

political leadership which was so lacking in their own regions. Indeed the liberal policy of the Austrians was such that it even embarrassed the Poles, in that it encouraged Ukranian separatism from the first, granting equal language and educational rights, and creating a class of educated Ukranians who came to resent the attitude of the Polish landlords toward the peasantry.

The partition of Poland, which was so largely due to its transitional position and dynastic instability, awoke an irrepressible spirit of nationalism amongst the subject people, until at length national revival counteracted geographical decline. Love of the native land and respect for historical tradition have inculcated in the Polish heart the desire to serve Poland at whatever cost. Inspired by such a motive, Poles have fought on almost every battlefield of Europe since the time of Napoleon, in the hope that their native land will receive its just consideration. Polish patriots in exile have organized revolutionary movements within the country, and sought to gain support from without. Finally, with the First Great War, the long awaited opportunity for independence came, and although the Polish effort from 1914-18 lacked harmony, it was sufficiently powerful to impress itself upon the peace conferences, and to lead to the formation of the Republic of Poland in 1919.

It was generally agreed that the new state should include all the territories inhabited by predominantly Polish populations, that it should have an access to the sea, and, further, that it should possess enough of the resources of the Northern Plain to give it economic independence and territorial integrity (*see Fig. 4*). "As interpreted by Polish leaders, this meant a return to the boundaries of the eighteenth century", and they made claim to Upper Silesia, although this was an integral part of German economy, and to Eastern Galicia, although this was inhabited mainly by Ruthenians; while some of them even expected that East Prussia would be included. The realities of the situation, however, had altered considerably from the eighteenth century; areas then Polish had become occupied by foreign populations and tied in with foreign economies. Plebiscites taken in East Prussia showed that the Polish elements preferred to stay with the Prussians, with whom they were united in the Lutheran faith, rather than join their fellow Poles, who were Catholics; while a plebiscite in Upper Silesia went overwhelmingly in favour of Germany. A compromise was made by giving the Poles the chief economic assets of the Silesian coal and iron field, and by including German-speaking areas in a much simplified Corridor.

As for the eastern boundary, the Allied Council suggested a line between the indisputably Polish areas and those containing a high percentage of White Russians and Ukranians, a line which "without prejudicing the provisions which must in

Fig. 4

Factors in the Polish frontier problem. The Polish homeland is threatened by German intervention at its only outlet, the Corridor, and by Lithuanian and Russian interests in its chief inlets, the Vilna and Lemberg gateways. In addition, the only important coalfield, Upper Silesia, is partitioned, and stands astride an enemy frontier. Access to the sea, sufficient economic resources, and territorial integrity were granted to Poland, but on a minimum basis, which made it difficult for the country to realize its independence. Note that although the eastern border transgresses linguistic divisions, it roughly coincides with the cultural limits of the Roman Catholic Church, which is the faith of Poland, as distinguished from the Lutheranism of Germany and the Orthodox faith of Russia. Sixty-eight per cent of the population is Polish, 14 per cent is Ukrainian, 10 per cent Jewish, 3.7 per cent White Russian, and 3.7 per cent German.

the future define the eastern frontiers of Poland", had the geographical plausibility of dividing off the Vistula Basin from the Russian plain. However, "the rights that Poland might be able to establish to the East of the said line (known as the Curzon line) were expressly reserved". In other words, the line was in reality an armistice zone between the contending countries; it was not in itself a frontier. It was hoped that the frontier would be settled by negotiation.

Unfortunately, the warfare that had already broken out between Poland and Russia continued. The brilliant Polish campaigns in the Ukraine, leading to the capture of Kiev, in 1920, were matched by the equally striking counterthrust of the Russians through White Russia, that carried them to the gates of Warsaw. Territorial claims on both sides varied with the fortunes of war. Even before the Poles turned the Russian tide and drove them out of the Vistula Basin, an armistice line from Dryssa to Bar was offered by the Soviets, running through White Russia and the Ukraine. The treaty of Riga in 1921 put an end to these struggles, and made a settlement between the two armistice lines, which gave to the Russians the command of the Jitomir-Minsk lateral railway, and to the Poles the Brody-Baranowicze railway, running on either side of the Pripet marshes. Thus a compromise between the main strategic interests of each nation was reached. And if it is true that the Poles gained a frontier far to the east of the ethnic border, which included many White Russian and Ukranian majorities, it is also the case that they were able to protect the religious freedom of these people, who, in the regions claimed by Poland, were largely of the Catholic persuasion. In other words, the boundary was valid as a cultural, if not as a linguistic one (*see Figs. 4* and *5*).

Fig. 5

The eastern boundary of Poland. The eastern frontier, drawn largely for strategic reasons, also has considerable historic and cultural significance. Laid down at the Treaty of Riga in 1921, it gives the Poles command of the chief openings into the Vistula Basin, namely those through the broad gateways of Vilna and Lemberg. At the same time it maintains possession of the important lateral railway, running through Brody and Baranowicze. It lies far to the east of the indisputably Polish population, and east of the Curzon line, which the allies suggested as a basis for discussion. However, it does not go as far as the line at one time offered by the Russians, from Dryssa to Bar. While including large ethnic minorities, the Riga frontier preserved the religious liberty of the Catholic majorities, of the same faith as the Polish homeland.

The new Polish state had at last given human definition to a physically indefinite environment. Had the terms of that definition been clear and harmonious, security and even well-being might have been attained. The human scene was full of anomalies, however, and the growth of the new Republic was very uneven. Since the boundaries were drawn for largely strategic reasons, they frequently transgressed economic, ethnic and cultural frontiers, and, what is more, the strategic interests of neighbouring states.

For example, the Polish Corridor, however necessary it was for the nation as a whole, interrupted the unity of German possessions, cut across German lines of trade and communication, subjected nearly half a million Germans to foreign rule, and breached the Lutheran front. The national asset which it represented was offset by international friction. The same was true of the Silesian coal field, where "each country injured itself as much as it did the other". Similar problems were met with in the acquisition of the Vilna district, secured from Lithuania, and in Eastern Galicia, where a strong Ukranian minority existed.

Had the Poles been assisted in the solution of these problems by the co-operation of their neighbours, or even

been left to their own expediencies, they might well have overcome such difficulties, so great was their determination and zeal. But, unfortunately, the external situation continued to aggravate and even to exploit the internal weaknesses, and Poland was soon to be caught up once more in the balance of power in Europe.

In 1924, at the end of its major territorial struggles, Poland was faced with an economic crisis, which could only be met by the severe restriction of imports from abroad. Eventually all non-essential imports were banned, and the country tried to build up a favourable balance of trade through the export of agricultural goods, even at the expense of want within the homeland. But it was unable to break down the high protective tariffs in Germany, France and Britain, or to circumvent the conventional system of European trade which demanded acceptance of imports in a volume comparable to that of exports. Up to 1929 it was able to obtain considerable foreign investments, with which it tried to develop its own industries in lieu of imports, but, with the depression, most of the foreign money left the country. As a result, a strong reaction set in towards a self-sufficiency which would make Poland economically as well as politically independent.

This did not seem impossible. The Poles were relatively wealthy in land, mines and people. Agriculture was commercialized as far as the co-operation of the landed aristocracy and the peasantry would permit. By 1935 the normal pre-war production of staple crops had been achieved. One of the most advanced schemes in Europe, the reclamation of the Pripet marshes, was pressed forward. Nevertheless, such was the feeling of insecurity and such the frustration in the foreign markets, that the agrarian party was more interested in political than in agrarian reform.

In the same way, much was done to advance Polish industries. The extraction of coal increased 30 per cent over pre-war levels. A great national railway was built to connect the industrial areas in Silesia and Galicia with the new port constructed on the Baltic, called Gdynia. A lively export trade in Polish hardware, textiles, pulp and paper, and in surplus quantities of oil and coal was carried on. Yet this development was hindered by the same sense of international insecurity, which necessitated a controlled economy, and the maintenance of exhaustive armament programmes. The early industrial area, in Silesia and Western Galicia was extremely vulnerable to German attack, and, in an effort to create an arsenal that could continue production in time of war, a new manufacturing district, known as the Central Industrial Region, was begun, under Kwaitkowski. But Polish industry suffered from the serious handicap of inadequate raw materials; it possesses only ten of twenty-four essential industrial supplies; and more than half of the national imports consist of raw materials. Up to 1939, the negotiations with other powers for the procurement of these had been generally unsatisfactory, and Poland was as frustrated as in the case of foreign markets.

Thus it can readily be understood why the problems of agriculture and industry were, in the last resort, subordinate to the general political situation, and why, lacking geographical security and economic opportunity, Poland was thrown back more than ever upon its human resources. Fortunately, it discovered a series of great national leaders, who largely overcame these inherent handicaps, and might have established Poland as an influential and peaceful republic, had not the balance of power once again pitted the Western against the Central powers, and these in their turn against Russia.

The outstanding political figure has been Marshal Pilsudski, who, amongst other things, prevented the possible foreign intervention that the establishment of a monarchy would have meant, greatly improved public administration and finance, strengthened the army until it was able to promise territorial integrity, and made a peace with Germany at a time when such a peace was the prerequisite of Polish existence. However, the attempt of his military hierarchy to systematize his

personal regime after his death doomed Polish politics to an unsettled condition. The army held the power, but was not representative of the people at large; while the opposition was disunited. The peasant party, which continued to be the strongest, was chiefly concerned with constitutional reform. The Socialists, who supported a national economy, the Labour party, with which Paderewski was once associated, the pro-Russian National Democrats, and the pro-Nazi National Radicals, were at cross purposes with each other, and seemed to meet only on the common ground of Polish territorial integrity. They could reach no agreement on domestic issues, and this failure weakened Poland in the face of its enemies.

In 1936, the Government was strengthened when Rydz-Smigly was made "second citizen", and took over an effective share of the President's executive power. The new constitution of the preceding year had already decreed a new and elevated senate to be elected by a group of select voters; and, at the same time, the suspensive powers of the President were increased. The country was geared to approach the growing crisis which rampant Fascism appeared to make inevitable. Indeed, the strengthening of the inner fabric of the State was paralleled by attempts to meet the external pressures involved in the European balance. As early as 1927, Poland had supported the League of Nations in reaching an understanding with Lithuania in the Vilna dispute. The pact with Germany seemed to guarantee the western borders. The eastern frontier had been formally ratified by the Soviet Union. Nevertheless, when trouble at length began to threaten the country, it did not follow a policy of slavish accommodation, but insisted on the maintenance of its rights without regard to intimidation or aggression. Finally, when it looked as if the age-long centripetal forces would once more drive in toward its heartland, and attempt its partition, Poland sought that alliance with the Western powers, which, had it come earlier, might have saved the peace of Europe.

Even this brief outline of contemporary affairs will show the heavy odds against which Poland has had to struggle since the last war, and with which it is still faced. A country without physical definition, it has had to meet the supremely difficult task of supplying human definition to its sphere on the Northern Plain. A country which has acted as one of the chief "protector nations" guarding Western Civilization against pagan or Asiatic invasion, it has been forced to sacrifice the uninterrupted growth of its own unity as a nation. A country surrounded by adolescent states, each in the expansionist phase of its development, it has had to concentrate its energies upon strategic and political problems, in order to maintain its territorial integrity, and has been unable to mature in economic and social status.

It would be quite unfair to the Poles to blame them for their present situation. They are, to an unprecedented extent, the victims of geographical circumstance. The same topographical conditions which have left Poland with a predominantly indefensible boundary line, have, at the same time, made it the crossroads of Eastern Europe. It is the country most affected by an unequal balance of power in Europe, and one of those least able to equalize it. The independence of Poland is dependent upon the co-operation of all three groups of powers in Europe, Western, Central and Eastern. As long as the withdrawal of this co-operation is a possibility, Poland must consider itself insecure, and must take whatever measures it thinks fit to safeguard its own integrity. And it is in this light that the Polish claims to German territory as far west as the Oder and the Neisse, as well as its insistence on the maintenance of pre-war frontiers on the east, must be understood. Only such deep defences could be of service, unless its boundaries were guaranteed within the framework of a European system of power that remained in equilibrium. Conversely, the best policy for preserving a stable Europe would seem to be the establishment of a strong Poland.

Boats with pastel hulls and pastel sails crowd against the quay of the inner harbour at Concarneau. They are large enough to go out for a fortnight's fishing in open sea. Tunny is an important part of their catch. Concarneau is renowned for the beauty of its women, one of whom is here seen carrying a tunny by the tail! Most of the catch is put up in brine soon after being taken, and is unloaded in great barrels on the quay.

GOOD WIND PUSHING

Jottings of a Cycle Trip in Brittany, 1938

by **BETTY BRIDGMAN**

Photographs by the author

THERE was no shelter from those full winds off the Atlantic. They swept our bicycles across the granite bulk of Brittany, and fifty miles a day was nothing—if we went their way. But these winds were not given to sea-girt Brittany to help American tourists pedal along its coast. They fill the sails of Breton craft, and make this great jutting knob of land the home of the finest sailors and fisherfolk of France. Yet the cyclist too learns to wave his cap in the merry Breton manner and cry, "*Bon vent me pousse*—there's a good wind pushing me!".

As soon as you leave the salt meadows of Mont St. Michel you know you are in Brittany. Dark headlands rise out of the bay, roads begin to climb hill after hill. Before your wheels bump across the cobblestones of St. Malo you have seen farmers threshing with flails, hobbled cows, and hand-turned cider presses at work on thatched farms. Women are wearing the white *coif* or top-knot cap of their district.

The strangeness of Brittany comes over you at once. Here are Frenchmen who are not French, who own no kinship with their countrymen. This region was Celtic five hundred years before Christ, and the Celts called it Armorica—the land near the sea. It reaches out almost wistfully toward western England and so it was to Armorica that persecuted Britons came when northern invaders swept over England, after the Romans left. Armorica became a second Britain, or Brittany, and even now its people are more akin to the Cornish, Irish and Welsh than to the French.

Brittany became a part of France in the sixteenth century by accident, when Anne, duchess of this independent province, married two French kings in succession, Charles VIII and Louis XII, and

Saffron-red linen, faded and patched with new materials, makes the fishermen a colourful complement to the blue-green of their nets. Wooden shoes are the fashion in this trade. Sorted out in trays, the sardines are passed up from the low boat to be stacked carelessly on the quay, and then borne on wooden stretchers up to a canning factory at hand. The "Dz" seen on every boat evidently indicates that its home port is Douarnenez.

left a grandson heir to both kingdom and duchy. But in Basse Bretagne, or western Brittany, peasants still speak a Celtic tongue. The French language and government, and even the institutions of Christianity, have been superimposed upon a pagan people. It is a land of granite where rocks are feared and worshipped, where reign a multitude of saints Rome will not recognize, where life and death come from the sea and the winds that blow over it.

We walked along the sea-wall of St. Malo. The tide was running in around the small island where Chateaubriand, brilliant romantic, is buried. A packet boat from Jersey laboured across choppy waves, making for the same harbour that Jacques Cartier hailed on his return from exploring the Canadian Coast. Cartier walked the heights of Quebec and climbed Mount Royal, but he was born and died in St. Malo, and this harbour was home. For the Bretons were bold explorers. There is good reason to believe they fished the coast of Newfoundland before Columbus and that the name of Cape Breton Island commemorates their early voyages. Numbers of them came to New France as colonists in the seventeenth century as well, and their songs and customs still flourish in Eastern Canada.

At St. Malo we first saw the Brittany of Chaucer's "Franklin's Tale": black rocks over which Dorigen wept for her husband's safety. This was to be the shoreline of Brittany from St. Malo around Brest to Quiberon—rocky islands, sheer cliffs. Côtes du Nord, Finistère, Morbihan—the very names of these *départements* sound like the thunder of an ocean against unyielding granite.

In Brittany no farmhouse hangs out the bed and breakfast sign we had looked for in England. We stopped at small spotless inns, wheeled our cycles (called Ariel and Pegasus) into the kitchen, and ate lavish meals at low prices. Every morning, on a narrow street full of sunlight, we would pump up our tires and turn west into the arms of the wind. Beyond St. Malo few villages were encouraged to grow into towns, and village life was enchanting. We would look on, as at Yffiniac, while women scrubbed their linen on smooth stones in a little stream. Then they trundled the wash home in

At Landerneau, Finistère, an interesting group of Breton peasants waits for the train from Brest. We were skipping over an inland section where cycling was less rewarding, and were struck by the unusual dress of some fellow-travellers. This young girl is wearing the *coif* of a region in southern Brittany—a ten-inch cylinder of stiff home-made lace, held on by wide bands of the same lace tied round her chin. Her father's black hat has a wide velvet ribbon which hangs down his back and swirls round in the breeze.

Tuesday is market-day for Paimpol, on the north coast of Brittany, and selling poultry is a matter requiring personal supervision. Farmers' wives line up against a wall, each holding a live chicken or duck. Most seem to have only one fowl for sale, and when that is disposed of, they can go about their shopping. A shower has just ended, and black umbrellas are furled and hung over their arms. The wide voile cap of the Paimpolaise stays immaculately starched even in the rain!

wheelbarrows and spread it on hedges in the sun.

Like all of Brittany's tourists, we had hoped to see a "pardon", that religious festival peculiar to Breton villages when music and costume and pilgrimages create a holiday mood, when you bring your cattle to be blessed at the church or watch a priest sprinkle holy water on the sea. Late in September there are few annual pardons still to be held in Brittany, but we felt compensated after touring the market in Paimpol.

Shabby cyclists never happened on anything more delightful. We had expected a fishing village, the one celebrated by Pierre Loti in *Pêcheur d'Islande*, and at first were greatly disappointed; but an amused Paimpolais vindicated Pierre Loti by telling us that Iceland fishing has been taken over by St. Malo. I was annoyed. St. Malo is no fishing village; in spite of its appearance, suggesting the Lower Town of Quebec, it is now so modern that we had seen a Hollywood movie shown outdoors, in the public square.

But as we turned away there was a clatter on the cobblestones behind us. In gusty little groups, wide black skirts were whisking across the square and down a narrow street adjoining. Tuesday is market-day for Paimpol and all the region round. Travelling vendors had set up push-cart dry-goods shops in a tiny square. We braved the crowds for the sake of a new experience. Here was a boy shrugging into ready-made coats while his mother watched sharply. A woman burrowed through a cart full of cheap handbags. Shoe-strings, slippers, bolts of cloth, babies' rattles—everything that cannot be made in a farm kitchen! This was the dime-store equivalent for Brittany.

We jostled our way down another street. In a larger square to the west stood an old bell-tower, the church of which had disappeared. The vegetable market spread around it. Horse-carts filled with cabbages, lettuce or beans milled around on the periphery. The fish market sheltered under a long dark shed, and here were all the second courses we had eaten in France. By now we were no strangers to snails, an *hors-d'oeuvre* on Breton menus; still, the sight of a wet, vaguely moving heap of them made us shudder a little.

The air outside was very fresh in contrast. Now women were pushing past with loaded baskets—the eleven o'clock train was filling up; often they carried live chickens or a live hare by the legs, head-down. We walked up-stream to search for the live-stock market.

It was conducted very simply. Against a wall stood a line of old women wearing the cap of the Paimpolaise. Rain had just ceased, so black umbrellas hung over their arms, and each held a live chicken or duck. Prospective buyers pinched the wares to see if they were fat enough for the price, and presumably after each old lady had sold her one fowl she went home content.

We went out of Paimpol to the west as part of a long procession of bicycles. Young women from sea-front farms had come under their own power. Their loads were much heavier than our small packs, but they swayed past us without effort, their skirts blowing back in the wind.

How did their pretty white caps stay on? The Paimpol *coif* is a steep-roofed shed of thin voile, with stiff white points hanging over the ears. The least breeze should waft it away, but we soon saw that it is gathered round a firm top-knot of hair and thus held fast.

We could not quite forgive Paimpol for giving up its Iceland fishing, and Tréguier and Perros-Guirec were likewise disappointing. Were there no fishing villages left in Brittany? Because we were cyclists, however, we found solace in the open road. Towns were crammed with interest—far more so than in England—but the pink macadam west of Paimpol made our wheels spin eagerly on these days of autumn equinox, and the kilometre stones went by so quickly we could almost beat time by them. Everywhere the main roads were excellent. Inland from the coast, Brittany becomes a moor, and can nourish only heather, gorse or bracken, so that views are wide and unbroken.

We mused on the plight of Breton trains. It was a misty morning in Morlaix and we were looking up from the harbour to the beautiful two-storied viaduct that spans the deep valley; 300 yards long and 194 feet high, it is a symbol of the desperation of civil engineers in these parts. Brittany was made long before railroads and with no consideration for them. The coast is slashed with the estuaries of tumultuous rivers, and the hills are, to an engineer, deplorable. In 1861, with the building of this viaduct, the main line from Paris managed to fight its way out to Brest, but then it lost all initiative and refused to cope with the rough terrain on either side of this line. Only a light railway can shuttle round the hills and serve some of the coastal villages. Train schedules are correspondingly awkward, and we were glad to be independent of them. Our British cycles could follow any road and gave us a low gear for hills.

Morlaix has more to show than a viaduct. Here Christmas-card houses crane over little streets. Milk carts clatter over the cobblestones. Half a dozen churches swing open their doors on curious musty interiors. Women take their wash to a dark little river that skulks through the centre of town.

In a one-sided street that runs on top of a wall we found a tottering house of the fifteenth century, *La Maison de la Duchesse-Anne*, named for the "petite Brette" who was twice Queen of France. It is a treasure-house of Breton culture. In its great hall a striking staircase winds up behind a carved wooden pillar. (This race of sailors became master carvers during the winter.) On the upper floors are dummies dressed in costumes of various sections of Brittany.

Do Parisians consider this region the most provincial in France? Let them see how Breton costume has been influenced by all countries of Europe and the East. Sailors brought home specimens of the dress of far-away lands—Russia, Serbia, Turkey—and details from these would appear on the black velvet bodices of the girls in Morlaix or on the wide black hats of the boys.

This old house had many of the *lits-clos* or beds with sliding doors. All were of very dark wood, richly carved. You climbed into bed from the foot and when you closed the doors behind, only a small hole, often heart-shaped, let in light and air. The *lit-clos* is still to be seen on wealthy farms in Basse Bretagne, but often its elaborate end-piece with the doors has been detached and turned into a buffet cupboard, for which it is well suited.

Writers find inspiration in the north coast of Brittany: we remembered Chateaubriand at St. Malo, Anatole Le Braz and Ernest Renan at Tréguier, Pierre Loti at Paimpol, and Sienkiewicz near Ploumanac'h. But the south coast attracts painters. Not all are as famous as Gauguin, who founded the "School of

On the black little river that skulks through Morlaix you can see washing done any week-day. A canopy protects the industrious housewives from rain, and no one feels too hurried to chat with passers-by who did up their laundry yesterday. Reflections of windows in bordering houses shimmer on the water. Just below this point the stream dives underneath the central part of Morlaix and does not come up until it reaches the harbour.

Breton housewives in the village of Yffiniac, Côtes du Nord, near St. Brieuc, make the Monday wash a social occasion! They bring their linen in wheelbarrows to this convenient reservoir on the creek just outside Yffiniac. With brushes and strong soap they scrub their wash on the concrete ledge. It gets marvellously white! Then it is trundled home to be spread on bushes and dried in the sun.

Pont-Aven" in that lovely river-village, but any one who can hold a brush is wildly excited by this sunny colourful coast, and he will eventually find his way to Douarnenez.

My growing impatience with former fishing villages that permit themselves to lapse into resorts subsided when we saw Douarnenez. We worked hard to reach it. Winds were still pushing us on the south coast—but from the front! It was late one afternoon when we coasted down off a high ridge into the little port, which pins a long peninsula to the mainland.

Our flight landed us in a blue and gold world, so enchanting we could hardly believe it real. The sun was very low over white Tréboul, which shares this tiny harbour with Douarnenez. And up the channel from the open sea came a fast fleet, motor-driven, of little boats with blue ghost-like sails, straight toward our pier. Soon we discovered their sails were really nets of filmy blue-green. These swung from every mast, drying, and flat brown corks weighted them at one end. Their colour complemented the saffron-red garb of the sailors, picturesque in wooden shoes and pancake berets.

When the boats were bobbing alongside the quay, fishermen sprang out and others passed them flat wooden trays filled with shining fish—sardines! We remembered then that Douarnenez is the most important sardine port in France. Eight hundred of these boats with sea-blue nets go out each morning during the season from June to December and return at sunset. Nets are hung straight down in the sea like curtains, and their colour makes them invisible to the sardines, which get their gills caught in the mesh and are unable to jerk free.

The trays of sardines, piled on stretchers, were marched off up the quay to a small canning factory which fronted the harbour. We trailed along and obtained permission to go inside the factory.

The first room seemed pitch dark after the brilliant sunset outside, but we made out two long tables with approximately forty women and girls standing, knives in hand. They wore dainty white *coifs*, incongruous in a packing plant. Presently a man brought in the first load of sardines. Knives sprang into action. The tables grew gory in no time, and fish heads piled up in pails to be sold to farmers for fertilizer. The silver bodies of the sardines went on into the next room to be canned and boiled in olive oil.

Here was a canning machine of the simplest sort. One man operated it and girls placed the cans one by one to be sealed. They smiled at us, but the machine made too much noise for conversation. Soon the girls began to match its rhythm with a Breton song, a sweetly melancholy air. Its sadness was of the soul, a Celtic lament, and had nothing to do with the fact that their wages in our currency amounted to six cents an hour.

We went out of Douarnenez just before low tide uncovered the noisome mud of the harbour—so our last impression was one of complete sensory beauty.

Quimper (pronounced "camp-air") is the chief cultural centre of the province, full of quaint loveliness, and faience. But for us Quimper was only a link between Douarnenez and Concarneau. We dropped down off a windy ridge where the smell of fish and brine blew against us, and found a neat harbour tightly crammed with boats, whose pastel hulls jostled one another at the quay. These boats of Concarneau are large enough to carry a crew of ten or twelve on a fortnight's voyage in the open sea. We tried to count them from the high machicolated walls of the old *Cité* of Concarneau, which fills a tiny island in the harbour.

As our bicycles flew over the hills, we often stopped to see calvaries or stone crucifixes that mark cross-roads throughout Basse Bretagne. Stones still have a part in the religion of these folk, devout almost to the point of being superstitious. Near Trégastel we had seen a menhir fifteen feet high, erected centuries before Christ, which had been "converted" into a Christian monument by the addition of a wooden cross on top. Across its sunken chest were carved the instruments of the Passion. To us on that desolate hill-side it seemed a symbol of Breton Christianity, which has borrowed many of its trappings from the pagan faith that preceded it.

We were cycling back from Quiberon along the sandy spit of the *presqu'île*, a literal French rendering of the Latin "peninsula". At one point a bare hundred yards of sand separates two blue bays, just enough land to carry the road and a lackadaisical little railway.

In those ten miles our bicycles carried us back nearly four thousand years, from fashionable hotels on the Quiberon *plage* to the grim stone-age monuments at Carnac, "place of bones". On a long plain north of the village thousands of great rude menhirs stand in regular rows, set up by a race that vanished before the Celts came to Armorica. Because Brittany abounds in such formations our names for them come straight from the Celtic tongue: menhir, a standing stone; dolmen, a table-like stone on uprights; cromlech, a stone circle.

We let our bicycles bump over rough pasture between the alignments of Le Ménec, largest of the fields of menhirs. Even at midday the gaunt boulders take weird shapes until you look directly at them. They seem grizzled and hoary, because of the lichens that cover them.

Once this section of the *département* of Morbihan must have been the Mecca of stone-age tribes for leagues around. The rows of menhirs at Carnac extend two and a half miles in all, with 2,813 huge stones. Nearly every field of them serves as an approach to a stone circle more simple in construction than Stonehenge, but oriented like Stonehenge in relation to the rising sun. The largest boulders are at the western end nearest the circle. When we looked east along the rows, centuries fell away, and we could imagine a great crowd shuffling forward, pressing toward the cromlech where their priests were performing gruesome rites of sacrifice.

Legends have grown up about the alignments at Carnac and persistent children will tell you, for a few *sous*, that the huge blocks of granite are pagan warriors who pursued St. Cornély until he turned them into stone.

The highest point near Carnac is a man-made hill or barrow called the Tumulus of St. Michel, named for the Breton "saint of high places". The tumulus forty feet in height and more than three times as much in length, is overgrown with flowers and brambles and has a small chapel on one end. Escorted by a housewife who lived nearby, we walked straight through the mound the long way.

A string of electric lights cast eerie shadows along the low damp tunnel. Cinerary vessels and bones were found here when the barrow was opened in 1862, and these remains have gone off to the Musée Miln-LeRouzic in Carnac. A dolmen is at the centre, and now we realized that all dolmens were originally covered with great mounds of earth and rocks like the Tumulus of St. Michel, but erosion over thousands of years, and the fact that local farmers stripped off the soil to spread on their fields, have denuded most of them.

Almost as much as Carnac, the nearby village of Locmariaquer bristles with stone-age relics. The largest menhir in the world stood there, seventy-six feet high and fully twelve feet thick at its base—a single block of granite. It was taller than most trees. Lightning must have struck it many times, but in the eighteenth century a bolt shattered it, and now it lies across a field in four great pieces, one of which is forty feet long. This forgotten race of men could do astounding things with the most primitive methods, but none other of their works can rival this fallen giant of Men-er-'Hræc'h, the "fairy stone".

Our bicycles had taken us forward in space and backward in time, and it was only now, when most of Brittany lay behind us, that we sensed the strange background of this land, which seemed to thrust out a clenched fist to the wild Atlantic. Here at Carnac we could imagine that our lives were rooted in the forbidding granite of Morbihan, that we had stood here as long as these shaggy menhirs, leaning on the fresh wind, watching the sea. When we turned our cycles inland, up the Loire, we felt at our backs four thousand years of fierce headstrong history, and the wind dropped behind.

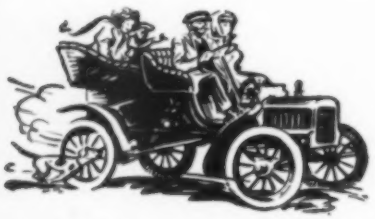
Bottom left:—The alignments of Carnac (rows of standing menhirs) stretch for two and a half miles across the plains and comprise 2,813 great boulders—a prehistoric work unique in the world. The alignments of Le Ménac, shown here, are the largest of the fields of menhirs, with eleven rows extending for three-quarters of a mile. These menhirs at the western end are the tallest, and originally formed the approach to a stone circle, or cromlech, most of which has disappeared. Though few stones show evidence of shaping by hand, the elements have worked at them through long centuries. One is split through from top to bottom; another, near the centre of the picture, has taken the shape of a standing bear (the chicken at its base helps the eye to measure it). Growth of lichens over the menhirs makes them look grizzled, hoary, almost alive. The white light-house on a near-by hill is modern.

Below:—This dolmen at Carnac, near the alignments of Kermario, had an entrance high enough for a man to pass through, stooped over. Part of its roof is gone. Dolmens were built as tombs for tribal leaders in prehistoric times. When the body, often cremated, had been placed within the little house of stone, earth and rubble were heaped over it to a considerable height, making a tumulus. But erosion has reduced the covering on many dolmens, baring the ancient structure of the tomb.

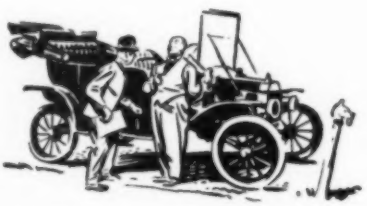
1904 — 40TH ANNIVERSARY YEAR — 1944

...The building of a great car . . . a great industry..a mighty war plant

In 1904 when a little group of Canadian business men decided to found a company for the manufacture of automobiles, they little dreamed what an historic step they were taking. They were convinced that the motor car would one day be an important means of transportation, though most people at that time looked upon it as a rich man's plaything. But it is doubtful if they foresaw that in forty years their little plant would grow into an industry employing thousands of men, supplying cars to millions of men and women through hundreds of Ford dealers. Little did they dream that in a future war of nations, Ford Motor Company of Canada, Limited would become the Empire's largest single source of military transport.



1904 Ford Motor Company of Canada, Limited commenced operations in a small building formerly used as a wagon factory. Seventeen men were employed, and the cars at first were assembled from parts imported from Detroit. In the first year of operation, 117 Ford cars were produced.



1908 After two years of exhaustive tests, the Company decided to standardize on the Model "T" Ford Car, using mass production methods. With increasing demand, the plant was expanded to ten times its former size. By 1912 the number of employees had increased to 565.

1913 Ford of Canada first started building its own engines thereby creating a new major outlet for Canadian raw materials. Since its introduction five years earlier, the Model "T" engine had already become famous for its simplicity of design and absolute dependability under all conditions.

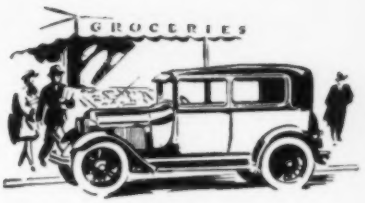
FORD MOTOR COMPANY

40TH ANNIVERSARY YEAR

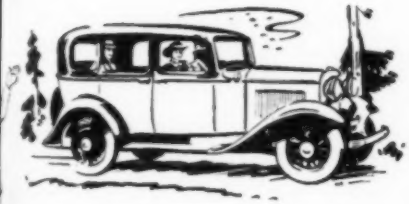
LARGEST PRODUCERS OF MILITARY VE

1915 By this time there was a chain of more than 550 Ford dealers and nine Ford Branches across Canada. The Company always believed it owed a debt to the public —that of providing expert service and genuine replacement parts for Ford cars as long as those cars were in operation.

1916 Plant expansion continued as demand increased. The War, 1914-1918, called for added output. In 1916-1917, production reached a new high of 50,000 units as a new branch assembly plan went into operation at Toronto, Montreal, Winnipeg, London and Saint John.



1927 After completely re-tooling the entire plant, Ford of Canada came out with the new Model "A". The car's modern design, power, speed and low cost operation won for it immediate acceptance. Buyers made their selection from several models with color and upholstery options.

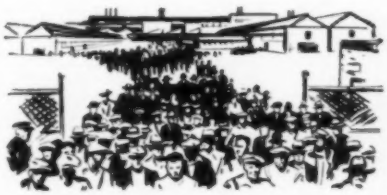


1932 Saw the introduction of the Ford V-8 engine. For the first time, a powerful, smooth, V-type eight-cylinder engine was made available to Canadian motorists in the popular price field. Its economy, simplicity and performance made it the talk of the automobile world.

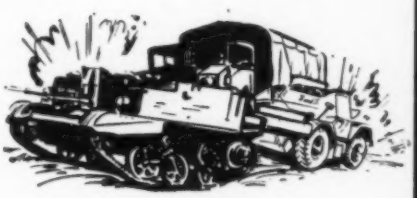
1939 70% of all automobiles exported from Canada were built by Ford, more than half of the entire Ford output going abroad. The huge export business, started with the founding of the company, was built up in every part of the British Empire, except the British Isles.

1940 Ford of Canada was already producing a large volume of war equipment and heavy shipments were made to many different battlefronts. As early as 1936 the groundwork for the production of military vehicles had been laid in closest co-operation with the Department of National Defence.

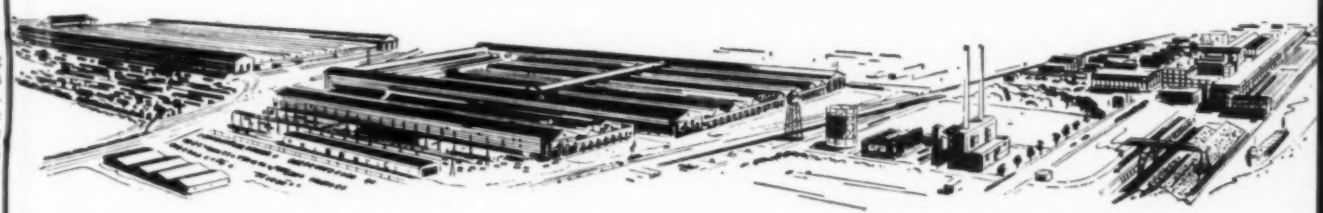
1942 The last passenger car for the duration came off the assembly line, climaxing a series of manufacturing curtailments of the previous 12 months. Now, until Victory, the Company's huge production was to be still multiplied but strictly confined to war equipment and essential vehicles.



1943 Ford employees had increased to 15,637, double the number prior to wartime. 4,300 Ford employees had gone into the Armed Services. 15,000 blood transfusions had been given at the Ford Clinic. Employees had invested $10,000,000 in Victory Bonds and War Savings Certificates.



1944 Midnight, August 17, the Company's 40th anniversary—and out of its mighty war plant comes a Universal Carrier, the 27,678th of its kind, the 338,978th Military vehicle for World War II, the 1,893,162nd unit produced by Ford of Canada in its eventful forty years.



OF CANADA, LIMITED

VEHICLES IN THE BRITISH EMPIRE

40TH ANNIVERSARY YEAR

The Canadian Geographical Society

HONORARY PATRON

His Excellency Major-General the Earl of Athlone, K.G., P.C., G.C.B., G.M.M.G., G.C.V.O., D.S.O.

CHARLES CAMSELL, C.M.G., B.A., LL.D., B. TYRRELL, M.A., LL.D., F.G.S., } Honorary Presidents

BOARD OF DIRECTORS

CHARLES G. COWAN, President

LT.-GEN. A. G. L. MCNAUGHTON, Vice-President
HON. W. A. BUCHANAN, Vice-President
R. C. WALLACE, Vice-President
HON. A. E. ARSENAULT, Assistant Judge, Supreme Court, Charlottetown, P.E.I.
MARIUS BARBEAU, National Museum of Canada, Ottawa
ARTHUR BEAUCHESNE, Clerk of the House of Commons, Ottawa
LAWRENCE J. BURPEE, Secretary for Canada, International Joint Commission, Ottawa
CHARLES CAMSELL, Deputy Minister, Department of Mines and Resources, Ottawa
COL. A. F. DUGUID, Director, Historical Section, Dept. of National Defence, Ottawa
MAJ.-GEN. W. W. FOSTER, Vancouver, B.C.
AUGUSTIN FRIGON, Montreal, P.Q.
K. A. GREENE, Ottawa
GILBERT LABINE, Toronto, Ont.
J. A. WILSON, Vice-President
O. M. BIGGAR, K.C., Honorary Counsel
K. G. CHIPMAN, Honorary Treasurer
E. S. MARTINDALE, Honorary Secretary
F. C. C. LYNCH, Department of Mines and Resources, Ottawa
B. R. MACKAY, Department of Mines and Resources, Ottawa
LT.-COL. L. T. MARTIN, Ottawa
Dean C. J. MACKENZIE, Acting President of National Research Council, Ottawa
LT.-COL. SIDNEY C. OLAND, Halifax, N.S.
F. H. PETERS, Surveyor-General of Canada, Ottawa
H. M. SNYDER, Sundre, Alta.
E. J. TARR, K.C., Winnipeg, Man.
GRIFFITH TAYLOR, University of Toronto, Toronto, Ont.
HON. T. VIEN, Speaker of the Senate, Ottawa
J. C. WEBSTER, Shediac, N.B.

Editorial Committee

F. C. C. LYNCH, Ottawa, *Chairman*
F. D. L. SMITH, Toronto
HON. W. A. BUCHANAN, Lethbridge
H. L. TRUEMAN, Ottawa
HON. A. E. ARSENAULT, Charlottetown
LT.-COL. G. L. P. GRANT-SUTTIE, Toronto
M. Y. WILLIAMS, Vancouver
D. C. HARVEY, Halifax
J. C. WEBSTER, Shediac
F. J. ALCOCK, Ottawa
ROBERT ENGLAND, Ottawa
JAMES SPENCE, London, England
GORDON M. DALLYN, *Secretary*
W. EGGLESTON, Ottawa
A. B. WATT, Edmonton
OLIVER MASTER, Ottawa
GEORGE W. BROWN, Toronto
R. J. C. STEAD, Ottawa

Executive Secretary and Editor
GORDON M. DALLYN

Auditors
DAVIS, BOYCE & COMPANY
Chartered Accountants

EDITOR'S NOTE-BOOK

G. A. Hills, author of numerous articles and reports on the soils of Ontario, was raised on a farm in Southern Ontario, and, upon graduation from high school, homesteaded in Northern Ontario. Mr. Hills later attended Ontario Agricultural College, following which he did post-graduate work in geography and land-use planning at The University of Toronto. He subsequently became senior soil surveyor for the Dominion Department of Agriculture, being stationed at Ontario Agricultural College, and is now soil scientist in the Research Division, Ontario Department of Lands and Forests, Toronto.

J. W. Watson, M.A., is at present Associate Professor of Geography in charge of developing the first Department of Geography at McMaster University. He previously studied at Edinburgh University, where he obtained his M.A. in geography, later becoming a medallist of The Royal Scottish Geographical Society and securing a research scholarship under the Carnegie Trust to study land use and settlement problems in the Highlands of Scotland, following which he lectured in geography at Sheffield University. Travelling in Europe for several summers whetted his interest in political geography, particularly that of Eastern Europe, and since coming to McMaster he has written and had published a number of articles on geopolitical problems. Professor Watson became a Fellow of The Royal Geographical Society in 1940.

Bernard Trotter, who collaborated with Professor Watson in the writing of "Poland in the European Balance", was a senior honours student reading in history and geography at McMaster University, who left to go overseas with the R. C. A. F., but who hopes to specialize on questions of foreign affairs when he returns to complete his degree and to undertake post-graduate work. Before leaving McMaster, he was editor of the university journal, *The Silhouette*, and won the Governor-General's Medal.

J. Lewis Robinson—See C. G. J. for September, 1943, and August, 1944.

(Continued at top of next page)

Betty Bridgman, whose article, "Good Wind Pushing", appears in this issue, is a native of Minneapolis who received her A.B. degree from Hamline University in St. Paul, Minnesota, in 1936, and has since had published a number of articles, poems and plays. She and her husband are very fond of cycling, and have been active in establishing youth hostels for hikers and cyclists. The trip through Brittany about which Mrs. Bridgman writes was part of a cycling tour of England, Scotland and northern France, and is of particular interest to-day, when so many of the towns and villages mentioned are appearing daily in the headlines of our newspapers.

AMONGST THE NEW BOOKS

Rockets, The Future of Travel Beyond the Stratosphere by WILLY LEY (The MacMillan Company, Toronto. Price $4.50).

The idea of establishing some communication between our earth and the moon or Venus or Mars has, for centuries, intrigued the minds of scientists and stimulated the more or less futile imaginations of writers of fiction. Apparently, if we are to believe our author, the rocket offers the only possible method of establishing this contact and, in addition, its development opens up possibilities for the scientific study of the upper atmosphere and, as we have learned to our sorrow in the last few weeks, for senseless and indiscriminate slaughter in warfare.

It appears that Mr. Ley became interested in rockets and rocket propulsion in his native Germany during the late twenties. He was prominent in a group that carried out some experiments in rocket propulsion over a period of several years, but apparently he had no inclination to co-operate with the Nazis when they assumed power and managed to leave Germany in 1935. This book is an interesting and well-documented account of the rocket from the earliest times and in particular its association with the idea of inter-planetary communication. The first section of the book is really a brief history of astronomical discovery which, while well-written and interesting, would appear to be covered in greater detail than its importance to the plan of the book would warrant. Apparently, the group with which Mr. Ley was associated was the first to use liquid fuel, gasoline, or alcohol, for rocket propulsion, an idea which found expression in the robot bomb and, experimentally, in various types of jet-propelled aircraft. Rockets of more conventional types were used by many armies a hundred or more years ago and, strangely enough, were highly developed in India by the armies of Hydar Ali and Tippoo Sahib who used them with considerable effect against the British. The present war has seen the revival of rockets by every army, their main advantage being the high velocity that is developed by the rocket, making a light hand-weapon capable of releasing a projectile that will knock out a tank or reduce a strong point.

An extremely timely and well-written book which gives the layman reader a well-rounded picture of a subject that has become increasingly important as the war progresses, even though the possibility or advisability of inter-planetary junketing may well remain a matter for future dispute.

P. E. P.

ON a bright September day in 1942, the schooner Commodore cleared the Port of Seattle . . . destination Durban, South Africa. More than a year passed before full details reached home of her adventurous 143-day voyage around the Horn. ¶Low rations, mountainous seas and a two-day hurricane that took away half the sails were climaxed by the loss of the ship's Chronometer overboard early in the voyage. But she made port safely . . . navigated by a Longines strap watch belonging to one of the officers. ¶"It was lucky I had that Longines watch", he wrote. Without any such need, thousands of Longines watch owners echo his sentiments daily. The feeling of satisfaction and security that comes from owning a competent watch, such as a Longines, is truly priceless.

*From documents in our files

Longines-Wittnauer Watch Co., Montreal, New York, Geneva, also makers of the Wittnauer Watch, a companion product of unusual merit.

Longines

WINNER OF 10 WORLD'S FAIR GRAND PRIZES
AND 28 GOLD MEDAL AWARDS

One of Canada's New 10,000 ton Cargo Ships

Painted for the makers of Player's Cigarettes by Gordon Gr

One of the new cargo vessels largely responsible for delivering the goods that are helping to win the war. They are armed fore and aft for defense against aeroplanes and submarines. Canadian shipyards are building them at a speed incredible in comparison with pre-war production.

PLAYER'S NAVY CUT CIGARETTES